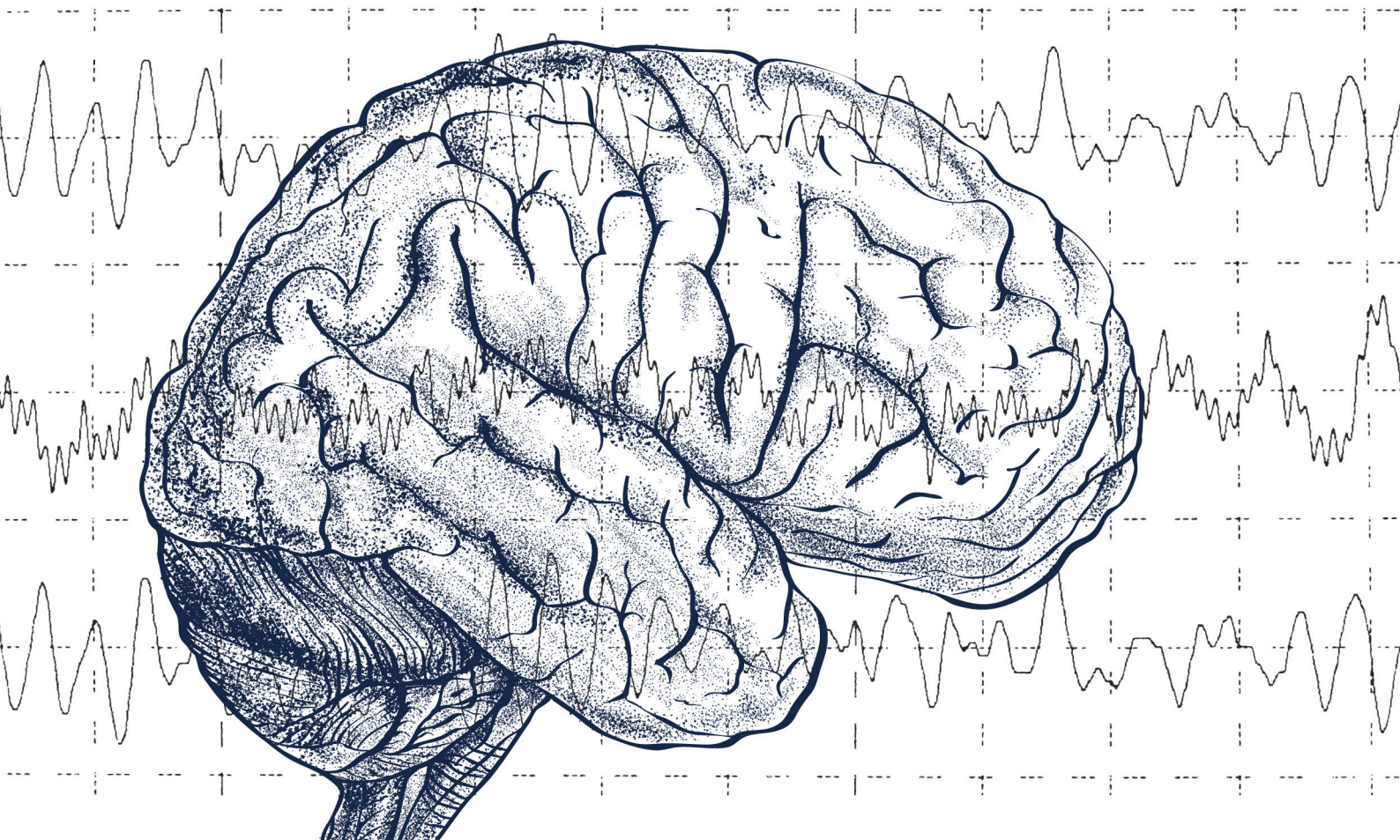


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of the Associated
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Editorial

Welcome to your preview of SLEEP 2026, the 40th Annual Meeting of the Associated Professional Sleep Societies, which is scheduled to be held in Baltimore, Maryland on June 14-17, 2026.

This abstract supplement unites the journal *SLEEP*®, and the science of SLEEP 2026. All abstracts presented at SLEEP 2026 are included in this supplement. This year, more than 1500 abstracts will be presented at the meeting. 140 will be presented in an oral presentation format, and the remainder will be presented in a poster format. Many authors of oral presentations will also be presenting their science in the poster hall, providing additional time to network with the authors of these important studies. In addition, this abstract supplement contains case reports submitted by individuals in Sleep Medicine Fellowships and other training programs.

Abstracts in this supplement are divided between Basic and Translational Sleep Science, and Clinical Sleep Science and Practice, and then assigned to one of 27 subcategories. Each abstract has a unique four-digit number to facilitate identification and location both within this issue and at SLEEP 2026. The four-digit number in the abstract supplement matches the four-digit code published in the SLEEP 2026 Mobile App.

The SLEEP meeting fosters an environment in which members and attendees learn about the latest basic, translational, and clinical science and technologies, promoting the continued growth of the field through the dissemination of new knowledge. We look forward to seeing everyone and sharing in the success of this pivotal event and hope you consider joining the American Academy of Sleep Medicine and Sleep Research Society in Baltimore, Maryland in June.

Allan I. Pack, MBChB, PhD
Editor-in-Chief

Abstract citation ID: zsag091.0001

0001

CIRCADIAN INSTABILITY IMPACTS BRAIN WHITE MATTER AND PREDICTS FUTURE MANIA SYMPTOMS IN AT-RISK YOUTH

Joao Paulo Lima Santos, Lara Labardini, Lauren Keller, Simey Chan, Adriane Soehner

University of Pittsburgh

Introduction: Adolescence and young adulthood are key periods for the emergence of bipolar disorder (BD). Instability in sleep and RAR increases BD risk, with recent evidence showing that its impact varies depending on pre-existing mania vulnerability. Yet it remains unclear whether this vulnerability extends to the brain. This question is critical because if pre-existing mania vulnerability heightens neural sensitivity to sleep and RAR instability, it could exacerbate disruptions in emotion-regulation circuits, a core process implicated in BD, and thereby increase susceptibility to its onset. White matter organization in fronto-limbic pathways, which supports emotion regulation and is sensitive to sleep/RAR disruption, offers a promising neural substrate for probing this vulnerability.

Methods: Participants (16–24y; N=112), recruited across a continuum of mania vulnerability (MOODS-SRL - Mania), completed 14 days of actigraphy and a neuroimaging session. Diffusion MRI was used to derive Neurite Orientation Dispersion and Density Imaging, focusing on the Orientation Dispersion Index (ODI) of emotion-regulation tracts (cingulum bundle, forceps minor, uncinate fasciculus). Clinician-rated mania and depression were assessed at baseline and six-months. Variability in sleep duration and sleep onset was calculated, along with the Circadian Function Index (CFI), a composite measure of circadian activity rhythm robustness. We tested whether associations between actigraphy-derived sleep/RAR metrics and ODI were moderated by mania vulnerability at baseline, and whether ODI metrics at baseline predicted 6-month mood symptoms.

Results: Lower CFI (greater circadian instability) was associated with higher ODI (greater white matter disorganization) in the uncinate fasciculus ($\beta = -0.22$, $P = 0.018$) among individuals with higher mania vulnerability. Higher uncinate fasciculus ODI predicted greater mania symptoms at follow-up and fully mediated the CFI-mania association ($\beta = -0.10$, 95%CI [-0.14, -0.02]). No effects emerged for depressive symptoms. Sleep duration and onset variability were not associated with ODI ($P > 0.05$).

Conclusion: Our findings suggest that circadian instability specifically impacts the uncinate fasciculus in individuals at elevated risk for BD, and this microstructural vulnerability predicts future increases in mania but not depressive symptoms. These results highlight a potential pathway linking rhythm disruption to emerging mania and underscore circadian rhythm stabilization as a promising target for early intervention aimed at protecting white matter integrity and reducing BD risk.

Support (if any): National Institute of Mental Health (R01MH124828; PI: Soehner).

Abstract citation ID: zsag091.0002

0002

DETECTING SLEEP AND CIRCADIAN DISRUPTION IN TBI USING WEARABLESAngeliki Pollatou¹, Elizabeth Metzger², J. Kent Werner¹¹Walter Reed National Military Medical Center, ²The Geneva Foundation/Uniformed Services University

Introduction: Traumatic brain injury (TBI) disrupts sleep and circadian rhythms, worsening cognitive and physiological impairments. Circadian dysfunction is difficult to measure and often mistaken for insomnia, leading to ineffective care. However, by capturing real-world diurnal patterns influenced by circadian biology, wearables offer potential to close this clinical gap. This study examines sleep-circadian interactions in sleep-deprived TBI and non-TBI participants.

Methods: Twenty-five participants (N=9 with TBI) were monitored at home for two weeks using the Oura ring. Diurnal rhythmic parameters, including acrophase and mesor, were derived from skin temperature via cosinor analysis. Midsleep time was calculated from sleep data. Participants completed the Insomnia Severity Index (ISI). After ~36 hours of sleep deprivation, participants underwent in-lab polysomnography (PSG) to assess sleep architecture. Linear regression models examined how TBI moderates relationships between circadian and sleep metrics (beta: interaction effect).

Results: Preliminary findings show TBI participants had significantly earlier diurnal rhythm timing, with acrophase at 1:55 AM vs. 3:02 AM in non-TBI participants ($p < 0.05$). TBI status moderated the acrophase-midsleep relationship ($\beta = -0.5$, $p = 0.033$), suggesting disrupted circadian alignment. While PSG parameters and ISI showed no group differences, wearable-derived measures detected disruptions not captured in-lab. Early findings indicate weaker associations between circadian markers and restorative NREM sleep in TBI, suggesting impaired homeostasis. ISI scores revealed divergent insomnia-circadian coupling patterns between the groups.

Conclusion: Initial analysis suggests wearables can detect disruptions in circadian-influenced rhythms in TBI that may be missed in traditional clinical tests. Findings indicate earlier circadian timing and impaired sleep-circadian integration in TBI, particularly post-deprivation. Wearables offer a non-invasive way to identify subtle disruptions with clinical potential. Future work will clarify the relationship between changes in skin diurnal rhythms and the disruption of the gold-standard 'pure' circadian biology. Results underscore the need for targeted interventions addressing circadian and sleep dysfunction in TBI populations.

Support (if any): Funding: CDMRPL-19-0-PR192622, W81XWH-22-2-0038. Disclaimer: The views, information or content, and conclusions presented do not represent the official position or policy of, nor should any official endorsement be inferred on the part of, the Uniformed Services University, the Department of War, the U.S. Government, or Walter Reed National Military Medical Center.

Abstract citation ID: zsag091.0003

0003

CIRCADIAN MODULATION OF PULSATILE CSF DURING SLEEP DEPRIVATIONAlisa Huskey¹, David Negelspach¹, Julia Fisher¹, Jung won Cha¹, Jason Katz¹, Kymberly Henderson-Arredondo¹, Catherine Seader¹, Allie Jepson¹, Salma Patel¹, Kathryn Kennedy¹, Xiaopeng Zhou², Daniel Forger³, Qiuting Wen⁴, William Killgore¹¹University of Arizona, ²Purdue University, ³University of Michigan, ⁴Indiana University

Introduction: Cerebrospinal fluid (CSF) influx, a key process of the glymphatic system, is driven by cardiac pulsations which move cerebral arterial walls and push CSF into brain parenchyma. In mice, CSF influx shows circadian rhythmicity, peaking during

rest periods, and dipping during active periods. In humans, pulsatile CSF waves are larger during sleep-deprived wakefulness, resembling CSF waves during sleep. This study examined both homeostatic and circadian modulation of pulsatile CSF during sleep deprivation in humans. Pulsatile CSF waves were expected to be larger over time, peaking during the sleep-deprived night.

Methods: Twenty-one healthy adults (i.e., 10 women; mean age = 23.6) were kept awake for 39 hours and scanned every six hours. Dynamic diffusion-weighted imaging ($b = 150$ s/mm²; TR = 2035 ms; TE = 67.20 ms) was used to model CSF cardiac pulsatility (pCSF) in perivascular spaces (sPVS) surrounding cerebral arteries (Wen et al., 2022). The amplitude of pCSF was quantified as the trough-to-peak range of its waveform. A cosinor model was fit to the data with a fixed 24-hour period using the GLMMcosinor package in R. Rhythmic parameters included the Midline Estimating Statistic of Rhythm (MESOR), amplitude, and acrophase (timing of peak). A linear term for hours awake was added to account for homeostatic sleep pressure.

Results: The MESOR of pCSF amplitude surrounding large arteries was 2.392 mm²/s ($\beta = 2.392$, SE = 0.130, $p < 0.001$) with a 24-hour amplitude of 0.223–3 mm²/s ($\beta = 0.223$, SE = 0.067, $p < 0.001$). Acrophase occurred at 20.90 hours of wakefulness at 4:23 am ($\beta = -0.815$, SE = 0.295, $p = 0.006$). There was a positive linear trend of time awake on the pCSF amplitude signal ($\beta = 0.009$, SE = 0.004, $p = 0.024$).

Conclusion: Pulsatile CSF, an index of glymphatic influx, displayed circadian rhythmicity that peaked during the typical rest phase (~4 a.m.). During this peak, pulsatile CSF waves appeared larger and more sleep-like in perivascular spaces surrounding major arteries. Consistent with predictions, pulsatile CSF amplitude also increased with accumulating homeostatic sleep pressure. These findings support dual circadian and homeostatic regulation of CSF pulsatility.

Support (if any): Army Research Office award W911NF2210223

Abstract citation ID: zsag091.0004

0004

ASSOCIATIONS OF ACCELEROMETER-DERIVED CIRCADIAN SLEEP-WAKE ABNORMALITIES WITH BRAIN HEALTH AND BIOMARKER PATHWAYS

Jingsong Luo¹, Ruiyi Liu², Jiayi Liu², Wangnan Cao¹, Shengzhi Sun²

¹School of Public Health, Peking University, ²School of Public Health, Capital Medical University

Introduction: Circadian sleep-wake abnormalities are common in older adults and frequently accompany neurodegenerative and psychiatric disorders. Evidence suggests that reduced circadian amplitude may be linked to conditions such as Parkinson's disease and depression, independent of nocturnal sleep quality. However, it remains unclear whether circadian disruption precedes disease onset and contributes to risk through alterations in brain structure or blood-based biomarkers.

Methods: We analyzed wrist-worn accelerometer data from 95,552 participants in the UK Biobank prospective cohort and derived key circadian rhythm metrics using an extended cosine model, including amplitude, mesor, and acrophase. Brain health-related diseases were defined as psychiatric and neurodegenerative disorders using ICD-10 codes. Quality-controlled biomarker data from the UK Biobank imaging center and blood assays

were incorporated, covering measures of brain structure, neurobiomarkers, blood counts, and blood biochemistry. Cox proportional hazards models were used to estimate associations between circadian metrics and incident diseases. Causal mediation analyses were performed to quantify the proportion of disease risk explained by each biomarker.

Results: Among 95,552 participants included in the analysis, 5,185 (5.4%) developed a brain health-related disease during 11 years of follow-up. After full adjustment, the risk of incident neurodegenerative diseases, most notably dementia, decreased with increasing circadian amplitude (HR, 0.71; 95% CI, 0.67–0.76) and mesor (HR, 0.89; 95% CI, 0.81–0.97), but increased with a delayed circadian phase (HR, 5.64; 95% CI, 2.18–14.56). For psychiatric disorders, particularly depression, risk decreased with higher circadian amplitude (HR, 0.88; 95% CI, 0.85–0.90), whereas increased with elevated mesor (HR, 1.12; 95% CI, 1.08–1.16) and an advanced circadian phase (HR, 1.60; 95% CI, 1.40–1.83). Causal mediation analyses showed that brain atrophy primarily mediated the association between circadian amplitude and neurodegenerative disease risk (proportion mediated, 0.16–0.85), whereas blood count and biochemical markers served as the main mediators for psychiatric disorders (proportion mediated, 0.03–0.20).

Conclusion: Our findings indicate that circadian rhythm disruption exerts distinct effects on neurodegenerative and psychiatric disorders and may serve as an early indicator of disease onset. These results provide new insights for the prevention of related diseases.

Support (if any):

Abstract citation ID: zsag091.0005

0005

VALIDATION AND COMPARISON OF MATHEMATICAL MODELS TO PREDICT CIRCADIAN PHASE AMONG PRESCHOOLERS

Nana Jiao¹, Uzair Alam¹, Olivia Walch², Hafza Dadabhoy¹, Insia Raza¹, Maci Kelley¹, Vivian Pham¹, Philip Cheng³, Jennette Moreno¹

¹Baylor College of Medicine, ²Arcascope, University of Michigan,

³Henry Ford Health System

Introduction: Having a later circadian phase is linked to risks for childhood obesity, which often persists into adulthood and is strongly related to metabolic disease risk-associated conditions, now increasingly observed in early childhood. However, accurately assessing circadian phase in young children is challenging. Mathematical models within applied mathematics provide a promising approach. This study aimed to validate and compare two models, the physics-based Forger and physiologically informed Hannay model, to advance circadian phase predictions using activity inputs in preschoolers.

Methods: As part of an ongoing randomized controlled trial, 69 parents of 4-year-old preschoolers (55.6% male, Latino 37.5%) completed 7-day wrist-worn actigraphy before a lab visit, during which dim light melatonin onset (DLMO) was assessed. Salivary melatonin was sampled hourly under dim-light conditions (< 5 lx). Actigraphy data were used to predict circadian phase. Model simulations were conducted using Runge-Kutta 45 numerical integration written in Python. Lin's Concordance Correlation Coefficient (LinCCC) was used to assess agreement between model-predicted DLMO and salivary DLMO. The Mean Absolute Error (MAE) and percentage of participants with a predicted DLMO

within 1 hr of measured DLMO were calculated. The Bland-Altman method was used to evaluate bias between two methods and to estimate an agreement interval within which 95% of the differences fall. A sensitivity test was also conducted, excluding participants with extended non-wear periods in their actigraphy data.

Results: The physics-based Forger model and the physiologically informed Hannay model demonstrated similar performance, yielding LinCCC values of 0.47 and 0.41. Following the removal of participants with extended non-wear periods, LinCCC increased to 0.50 and 0.49, respectively. The Forger model achieved a mean absolute error of 44 minutes, with 70% predictions within 1 hour of the salivary DLMO. The Hannay model showed a mean absolute error of 50 minutes, with 71% of predictions within 1 hr. The Bland-Altman analysis showed biases of -0.23 ± 0.95 for the Forger model and -0.32 ± 1.02 for the Hannay model.

Conclusion: Mathematical models using data collected from wearable devices can be used to predict DLMO among 4-year-old preschoolers. Further research is needed to refine and adapt these adult-based models for children across different ages.

Support (if any): P01HD109876

Abstract citation ID: zsag091.0006

0006

A PREDICTION MODEL OF SLEEP DURATION BASED ON SLEEP DIARY

Heenam Yoon¹, Dahye Lee¹, Hongjun Oh¹, Minah Kim², Sung Hyun Kim², Jeong Eun Jeon², Ha Young Lee², Jin Hyuk Yoo², Yu Jin Lee²

¹Sangmyung University, ²Seoul National University Hospital

Introduction: Sleep diaries provide a subjective record of individual sleep and are widely used for evaluating daily sleep. However, they remain limited in capturing long-term and continuous aspects of sleep behavior. The two-process model has played a role in analyzing the interaction between sleep homeostasis ($S(t)$) and circadian rhythms ($C(t)$), thereby advancing the understanding of the sleep-wake rhythm. Recent studies have applied the model to actigraphy data, although practical issues—such as the requirement for continuous device use—still pose challenges. This study proposes implementing the two-process model based on sleep diary to predict sleep duration, with the aim of exploring its potential application as a decision aid.

Methods: Sleep diaries and actigraphy data from 25 individuals without sleep disorders were analyzed (measurement period: 10.9 ± 1.1 days, mean $\pm$ SD). Binary data were generated from the sleep diaries by setting sleep periods as 0 and wake periods as 1, and $C(t)$ was estimated using cosinor analysis. $S(t)$ was designed to decrease during sleep periods and increase during wake periods, with sleep debt incorporated into $S(t)$ based on each participant's habitual and recovery sleep duration. For n days of prior data, the values of n and k were determined by applying $C(t)$ and $S(t)+k$ to minimize the error in estimating sleep duration. Using these optimized parameters, the two-process model was then applied to predict sleep duration for the subsequent day.

Results: Sleep data from 178 nights across 25 participants were evaluated by comparing predicted sleep duration with actigraphy-derived reference values. The root mean squared error (RMSE) of prediction was 1.31 ± 0.60 h, significantly smaller than the RMSE

obtained without incorporating sleep debt ($p < 0.01$, Wilcoxon signed-rank test). The correlation coefficient between individual mean predicted sleep duration and reference sleep duration was 0.81 ($p < 0.001$).

Conclusion: The proposed sleep diary-based model demonstrated reliable agreement with actigraphy-derived values. This approach can offer an accessible tool for evaluating sleep-wake patterns, with potential applications in decision-making and personalized sleep management.

Support (if any): This study was supported by funds donated to Mind the SHIM (Seoul national university hospital Health In Mind) Center, Seoul National University Hospital, Republic of Korea.

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0007

ASTROCYTE BMAL1 MEDIATES CIRCADIAN RHYTHMS IN PERINEURONAL NET REMODELING AND IMPACTS HIPPOCAMPAL SYNAPTIC PLASTICITY AND LEARNING BEHAVIOR

Philip Smith, Elsa Quilin, Katie Lefton, Celia McKee, Brendan Dang, Erik Musiek, Thomas Papouin
Washington University in St. Louis

Introduction: The circadian clock controls a vast array of cellular and organismal functions, from the molecular scale to behavior. But while each cell is regimented by a cell-autonomous clock, few studies in the brain have dissected the circuit and behavioral contributions of cell-specific clocks in astrocytes. Astrocytes are now known to play key roles in regulating synaptic function, circuit activity and behavior, but whether these functions are guided by astrocyte-autonomous clocks is unknown. Here, we report that the core circadian clock in astrocytes controls synaptic strength and plasticity, perineuronal net structure and learning and memory.

Methods: We employed Cre-inducible deletion of the critical circadian clock gene *Bmal1* in astrocytes (*Aldh111-CreERT2*; *Bmal1*^{fl/f}), which abrogates core clock function in a cell type specific manner. We observed variations in hippocampal PNN abundance. On an electrophysiologic level, we also examined synaptic strength and long term potentiation (LTP). On a behavioral level, we examined learning and memory performance in novel object recognition tasks.

Results: The inducible deletion of the critical circadian clock gene *Bmal1* in astrocytes upregulated genes related to extracellular matrix (ECM) remodeling. Consistently, we observed circadian variations in hippocampal PNN abundance in control mice which were abolished in astrocyte-specific *Bmal1* knockouts. In line with evidence implicating perineuronal nets (PNNs), and the ECM in general, in synaptic function and plasticity, we found that astrocyte-specific *Bmal1* KO mice had increased synaptic strength but blunted long term potentiation (LTP) as well as impaired learning and memory performance in the novel object recognition tasks.

Conclusion: Taken together, these findings suggest that the astrocyte clock regulates circadian rhythms in perineuronal net abundance as well as synaptic and behavioral learning and memory.

Support (if any): This research was supported by an NIH Washington University Department of Anesthesiology Training Grant T32GM108539 and NIH Grant R01AG063743 (to ESM)

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0008

COMPARING 6-SULFATOXYMELATONIN COLLECTED FROM LIQUID AND DRIED URINE SAMPLES: A PROOF-OF-CONCEPT STUDY

Rina Fox¹, Mark Newman², Marjorie Nelson¹, Anna Haralson¹, Michael Grandner¹, Lauren Hartstein³, Thaddeus Pace¹, Kathryn Reid⁴
¹University of Arizona, ²Precision Analytical, ³University of Arizona College of Medicine Tucson, ⁴Northwestern University

Introduction: Urine collection for quantification of 6-sulfatoxymelatonin (aMT6s) is common; however, obtaining samples is challenging for field-based research, as participants may not be able to transport liquid samples to a laboratory. Dried urine collection represents a potential solution, as dried samples can be shipped without risk of leaking. This proof-of-concept study explored the comparability of aMT6s derived from liquid versus dried urine.

Methods: Participants were N=15 healthy individuals affiliated with the University of Arizona. Participants self-collected five cumulative voids over 24 consecutive hours at home using a study-provided container (i.e., urine hat/urinal). These voids included all urine produced: 1) in the hour prior to bedtime on night 1; 2) overnight including the first morning void; 3) the three hours after the first morning void; 4) the four hours after the third collection; and 5) approximately four hours prior to bedtime on night 2. At the close of each collection window, participants saturated a piece of filter paper and filled a 70mL container with the collected urine. Remaining urine was discarded and filter papers were left to dry for □24 hours, during which time liquid samples were stored in participants' home refrigerators. Samples were then hand-delivered to the University of Arizona and stored at -80C until they were shipped in a single batch to a professional laboratory for analysis using mass spectrometry. aMT6s levels were adjusted for creatinine.

Results: Participants were M=34 years old (range: 20–39) and the majority was White (60%), female (93%), and non-Hispanic (53%). Seventy three of 75 expected samples were received; two were missing because no urine was produced during the collection window. One spurious sample was removed, leaving 72 samples for analysis. There was a strong positive relationship between aMT6s levels across liquid and dried samples ($r=0.987$, $p<0.001$). Per Bland-Altman analysis, 94% of samples were within the limits of acceptability.

Conclusion: Pending confirmation with a larger sample, dried urine seemingly yields equivalent information about aMT6s as liquid urine. This method could expand the feasibility and convenience of aMT6s assessment in various populations.

Support (if any): Funding provided by the University of Arizona College of Nursing. Support for materials provided by Precision Analytical.

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0009

FEASIBILITY OF THE IHEARTRHYTHM INTERVENTION: A CIRCADIAN HEALTH INTERVENTION FOR THE PREVENTION OF ACCELERATED SUMMER WEIGHT GAIN

Nana Jiao¹, Hafza Dadabhoy¹, Abeer El-Mubasher¹, Evelyn Syau¹, Julie Park¹, Olivia Walch², Salma Musaad¹, Debbe Thompson³, Tom Baranowski¹, Candice Alfano⁴, Stephanie Crowley⁵, Jennette Moreno¹

¹Baylor College of Medicine, ²Arcascope, University of Michigan,

³Children's Nutrition Research Center, Baylor College of Medicine, ⁴Stony Brook University, ⁵Rush University

Introduction: Around 20% of children began a trajectory toward overweight or obesity during early elementary school (ages 5-8). The transition from structured school routines to the less consistent summer period commonly disrupts children's daily routines, impairing metabolic regulation and contributing to weight gain. Yet, no evidence-based interventions address behavioral rhythms to prevent summer BMI increases in children. Further, engaging families during summer is challenging, making mHealth a promising solution. This study examined the feasibility of i♥rhythm, an mHealth intervention designed to reduce BMI gains in children.

Methods: In this randomized controlled trial, parents and their 5-8-year-old children with BMI > 50th percentile were recruited. A sample of 46 children (63% female, 52% White, 50% Hispanic) was randomly allocated to the intervention group (n=23) or the control group (n=23). The 5-week i♥rhythm intervention topics include consistent bedtimes, optimal light exposure, physical activity, timing of the last meal of the day, and maintenance planning. Data was collected at four time points over one year: baseline (B0, Spring), post-intervention (P1, Summer), nine months post-intervention (P2, Spring), and 12 months post-intervention (P3, Summer). Descriptive statistics of recruitment goals, intervention fidelity, intervention adherence (no. of intervention sessions completed), and retention were computed.

Results: Overall, we recruited 46 participants (recruitment criteria: n=40). Across the intervention group, 78% of the diaries were completed, and 82% had a diary completion level greater than 60% (criteria: 60%). Eighty-nine percent of the intervention sessions were watched in their entirety, with an average of 4.8 out of 5 intervention sessions (criteria 80%). Participant retention was 98% (45/46) at P1, 89% (41/46) at P2 and P3 (criteria: P1: 80% and P3: 60%). While salivary dim light melatonin sample were obtained on all participants that were retained at each time point, DLMO could be calculated for 93.48% (43/46) at B0, 85.4% (35/41) at P1, 75.6% (31/41) at P2, 82.9% (34/41) at P3, respectively.

Conclusion: The mHealth i♥rhythm intervention trial was found to be feasible for parents and children aged 5-8 years. Future

studies may consider enhancing biofeedback with wearable data and providing personalized real-time feedback. Sample sizes should account for potential missing DLMO data.

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0010

IMPACT OF BLUE-ENRICHED LIGHT ON CIRCADIAN PHASE IN SHORT-HAUL PILOTS WITH EARLY START TIMES

Lucia Arsintescu¹, Sean Pradhan², Julia Stone³, Erin Flynn-Evans⁴

¹San Jose State University, ²Menlo College, ³University of Melbourne, ⁴NASA Ames Research Center

Introduction: Commercial airline pilots are often required to work early in the morning, before sunrise. These early starts often result in shortened sleep due to the need to go to bed and wake up early. Consequently, pilots may experience reduced alertness and performance while at work. Blue-enriched morning light exposure is an effective countermeasure for shifting circadian phase that could be useful in this population. Thus, we aimed to evaluate the effectiveness of blue-enriched light exposure to advance pilots' circadian timing during a series of early start work shifts.

Methods: We recruited pilots at a short-haul airline to complete a within-subjects randomized, counterbalanced study involving two early-start work blocks lasting five days, preceded by a baseline period of five days of daytime flying followed by 2-4 days off. Participants were randomized to either a blue-enriched light or a control condition for approximately 30 minutes during pre-duty briefing. Circadian timing was measured at the end of each work block via 24-hour urine sampling. Samples were assayed for 6-sulphatoxymelatonin (aMT6s) concentration, and cosinor analysis was used to estimate peak aMT6s secretion.

Results: The final sample consisted of 12 males (Mean age: 38, SD = 9.50 years). In the baseline light condition, the mean acrophase time was 04:17 (SD = 01:41), range: 00:33 - 06:26 while under the baseline placebo condition, the mean acrophase time was 04:07 (SD = 01:37), range: 01:03 - 06:23. In the blue-enriched light condition the mean acrophase time was 02:22 (SD = 01:35), range: 23:42 - 04:08 while under the placebo condition the mean acrophase time was 02:41 (SD = 01:35), range: 00:04 - 05:06. Mixed effects regression analyses showed no significant differences in mean acrophase time between the light and placebo conditions ($b = -0.55$, $SE = 0.29$, $p = .09$, $\omega^2 = 0.15$, $R^2(\text{Marginal}) = .04$, $R^2(\text{Conditional}) = .91$).

Conclusion: Circadian phase varied according to work shift start time showing large inter-individual difference in both conditions. Future research will explore how such lighting countermeasures influence alertness, performance, and sleep.

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0011

LATER AND IRREGULAR LIGHT EXPOSURE IN EARLY PREGNANCY PREDICTS SMALL-FOR-GESTATIONAL-AGE BIRTH

Alyssa Week, Peinan Zhao, Ronald McCarthy, Valene Garr Barry, Erik Herzog, Sarah England, Rebecca Cox
Washington University in St. Louis

Introduction: Light is the primary circadian entrainment cue, and insufficient daytime and excessive nighttime light contribute to chronodisruption, which is associated with adverse birth outcomes. Nightshifts during pregnancy are associated with higher rates of low birthweight. However, it is unknown whether naturalistic light exposure patterns during pregnancy are associated with real-world chronodisruption and adverse birth outcomes. We hypothesized that personal light exposure in early pregnancy correlates with lower diurnal melatonin amplitude and predicts higher odds of small-for-gestational-age birth.

Methods: Participants were 561 women with singleton pregnancies (agemean=29.27±5.20). We assessed light exposure (photopic lux) every minute up to 20-weeks gestation via wrist-worn actigraphy (MotionWatch 8, CamNtech Ltd.). We computed the following light exposure variables: first and last timepoint above 50 lux (FLiT; LLiT) and their standard deviation (SD), and mean timepoint and total time above 100, 500, 1000 lux (MLiT; TAT). We assessed diurnal melatonin via saliva samples provided at 4-hour intervals over 24 hours under real-world conditions and calculated amplitude using Cosinor analysis. We tested associations between light exposure and small-for-gestational-age birth with logistic regression models covarying for solar photoperiod (Model 1), age, parity, nightshift work, pregestational hypertension and diabetes, and tobacco, alcohol, or drug use (Model 2), and social disadvantage (Model 3) and associations between light exposure and diurnal melatonin amplitude with linear regression covarying for solar photoperiod.

Results: Later MLiT 100, MLiT 500, and FLiT 50 lux, greater FLiT and LLiT 50 lux SD, and lower TAT 100 lux were significantly associated with higher odds of small-for-gestational-age birth in Model 1 ($p < .05$). Later mLiT 100 and fLiT 50 lux and higher fLiT 50 lux SD remained significant predictors ($p < .05$) in Model 2. Light exposure did not significantly predict small-for-gestational-age birth in Model 3 ($p > .05$). Later mLiT 100 and fLiT 50 lux, greater fLiT 50 lux SD, and lower TAT 100 and 500 lux were significantly associated with lower diurnal melatonin amplitude ($p < .05$).

Conclusion: Later and irregular light exposure was associated with real-world chronodisruption and small-for-gestational-age birth. Personal light exposure is a potential modifiable target to improve circadian and obstetric health.

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0012

SHEDDING LIGHT ON CHRONOTYPE: BEDROOM LIGHTING BEHAVIOR PREDICTS CIRCADIAN PREFERENCE

Elle Wernette, David Pearson, Christopher Drake, Philip Cheng
Henry Ford Health System

Introduction: Artificial light can extend photoperiods beyond the natural daylength. This has been posited as a contributor to individual differences in chronotype, supported by the seminal camping study in which eliminating artificial light compressed and aligned chronotype with the natural daylength. However, this position includes an untested assumption that the unique contribution of artificial lights (i.e. above natural ambient light) is associated with chronotype. This study assessed this relationship

using smart technology to capture artificial lighting use in the bedroom.

Methods: Participant bedrooms ($n=15$) with standardized smart-bulbs were monitored for two weeks. Light usage and behaviors were tracked using a wireless switch and a wall-mounted spectrometer that measured both photopic (p-lux) and melanopic lux (m-lux). Chronotype was measured using the Morningness–Eveningness Questionnaire (MEQ; range = 42–62, mean = 49 ± 10 SD). MEQ scores were correlated with changes in p-lux and m-lux after light-switch presses during the morning (03:00–11:00) and evening (17:00–03:00).

Results: In the morning, turning lights on only resulted in a small increase in ambient light (30 p-lux, 13 m-lux), and bedrooms largely remained dim despite lights on ($92\% < 100$ lux). Even still, greater changes from artificial light in the morning was significantly associated with more morningness ($\beta_{p\text{-lux}}=.84$, $\beta_{m\text{-lux}}=.66$). In the evening, turning lights on also increased ambient light slightly (24 p-lux, 16 m-lux), and bedrooms almost always remained dim ($98\% < 100$ lux). Evening bedroom light use and chronotype was not statistically significant ($\beta_{p\text{-lux}}=.57$, $\beta_{m\text{-lux}}=.19$). Notably, 78% of all bedroom light use occurred in the evening.

Conclusion: Results suggest that most bedrooms are dimly lit (< 100 lux) and that artificial lights contributed minimal additional brightness (< 30 lux); however, use of artificial bedroom light in the morning had a stronger association with chronotype than in the evening. One explanation may be sensitization to light in the morning due to dark-adaptation during sleep. Future research should use longitudinal or interventional approaches to allow for directional inferences. These results underscore the need for awareness of how home lighting may contribute to circadian health.

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0013

THE RHYTHMS IN THE BLUES: MODELING AND MODULATING DIURNAL POSITIVE AFFECT RHYTHMS

Riya Mirchandaney¹, Meredith Wallace¹, Kathryn Roeklein¹, Allysa Quick¹, Margaret Kuzemchak², Duncan Clark², Daniel Buysse¹, Greg Siegle³, Brant Hasler⁴

¹University of Pittsburgh, ²University of Pittsburgh Medical Center, ³University of Pittsburgh, Department of Psychiatry,

⁴University of Pittsburgh School of Medicine

Introduction: Controlled laboratory protocols and naturalistic studies reveal a 24-hour rhythm in positive affect (PA), which reaches its lowest point in the middle of the circadian night and peak in the afternoon. “Evening-types”, who experience more depression, report PA rhythms that are delayed, blunted, and decreased. Chronotherapeutic interventions to advance circadian phase can improve mood, but the mechanisms are unclear. In a sample of adolescents with later sleep timing, we examined whether a 2-week chronotherapeutic manipulation was associated with changes in PA rhythms (i.e., shifting the phase earlier, and increasing both the amplitude and rhythm-adjusted mean).

Methods: 79 high schoolers (60% female, mean age = 17.5 years) who reported a weekend bedtime of 1 AM or later underwent a one-week baseline and a two-week experimental period (random assignment to manipulation or control). Participants were asked

to complete the Positive and Negative Affect Schedule (PANAS-SF) 5–6 times a day. DLMO was assessed once prior to randomization and once at the end of the protocol. Participants in the manipulation were asked to maintain a consistent rise time, advance their bedtime, reduce evening light (via blue light blocking glasses), and administer morning bright light (via ReTimer glasses) for two weeks. We used a cosinor variant of multilevel modeling with three-way interactions between cosine/sine terms, study condition, and study week, while controlling for age and sex.

Results: Model estimates indicated the overall presence of rhythmicity in PA ($p<.001$), significant differences in PA rhythms during both experimental weeks compared to baseline ($p=.02$, $p<.01$), and significant differences in the weekly changes of PA rhythms depending on study condition ($ps<.01$). Bootstrapped contrasts revealed that the change in acrophase from Week 1 to Week 3 was significantly different between the manipulation and control ($\square=0.469$ or 1.79 hours, $p<.001$). No other contrasts of change were significant.

Conclusion: By the final week of the manipulation, participants’ PA rhythms were significantly advanced relative to the control. Important next steps include examining how changes in PA rhythms associate with changes in sleep and circadian metrics (e.g., DLMO) and assessing whether changes in PA rhythms predict meaningful clinical outcomes (e.g., depression).

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0014

A NEW HOME DIM LIGHT MELATONIN ONSET KIT WITH IPHONE APP

Helen Burgess, Kate Lorang, Leslie Swanson, Jim Arthurs
University of Michigan

Introduction: The dim light melatonin onset (DLMO) remains the gold standard circadian phase marker in humans. We previously developed a proof-of-concept home DLMO kit and demonstrated that valid DLMOs could be collected at home, with objective markers of light exposure and sample timing. Nonetheless, the proof-of-concept kit uses costly external technologies such as photosensors (to monitor light exposure) and MEMS TrackCaps (to monitor sample timing). Here we present a new home DLMO kit which includes a novel iPhone app that improves upon the original proof-of-concept kit.

Methods: The new home DLMO kit includes a novel iPhone app that: (1) streamlines the home DLMO collection procedure, (2) maintains the objective assessment of light exposure and sample timing with internal app features, (3) provides real-time feedback on errors in light exposure and sample timing to both participants and an externally located researcher, and (4) provides cost savings over the original proof-of-concept kit. Programming capability includes options to (1) sample saliva at half-hourly or hourly intervals, (2) end sampling at participants’ habitual bedtime or up to 3 hours past habitual bedtime, and (3) set a light intensity threshold of choice to alert the research participant and externally located researcher in real-time that melatonin levels may be suppressed. At the conclusion of the home DLMO collection, the app emails a report of light levels and sample timing to the researcher. Saliva samples can then be sent to a qualified laboratory for assay processing.

Results: The new home DLMO kit has been extensively tested, including by external circadian research groups who report the

new kit to be an improvement on the previous proof-of-concept kit, and that the new kit can be implemented into research protocols. Flow diagrams of the back-end programming capability available to researchers and the front-end step-by-step display screens guiding research participants will be reviewed. Home DLMO profiles collected with the new home DLMO kit will also be reviewed.

Conclusion: A new home DLMO kit with a novel iPhone app is now available to better support the collection of DLMOs at home and facilitate research examining circadian timing in human populations.

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0015

ASSOCIATIONS BETWEEN BEDTIME PROCRASTINATION AND CIRCADIAN REST-ACTIVITY RHYTHMS ACROSS ONE YEAR

Steven Carlson¹, Helen Burgess², Bradley Appelhans³, Lauretta Quinn⁴, Chelsea Allen¹, Kathryn Reid⁵, Kelly Baron¹

¹University of Utah, ²University of Michigan, ³Rush University,

⁴University of Illinois Chicago, ⁵Northwestern University

Introduction: Circadian rest-activity rhythms (RARs) describe the circadian-mediated pattern of physical activity across the day. Alterations in RARs are associated with health concerns, including diabetes, cognitive impairment, and bipolar disorder. However, the sleep behaviors which disrupt RARs are poorly understood. As bedtime procrastination, or the tendency to delay sleep in the absence of external obligations, is associated with delayed and irregular sleep timing, the present study evaluated whether bedtime procrastination was associated with RAR disruptions across 1 year.

Methods: 96 participants (Mage = 35.8, SD = 9.8) with habitual sleep onset time between 23:00 and 03:00 completed at least two 7-day assessments of wrist-worn actigraphy over the course of 1 year (baseline, 6 months, and 12 months). Participants also completed self-report measures of bedtime procrastination at each timepoint, as well as one-time assessments of chronotype (MEQ) and circadian phase (DLMO). Non-parametric and parametric RARs were calculated from actigraphy data. Multilevel models were constructed regressing RAR metrics onto bedtime procrastination, demographic covariates, DLMO, and chronotype.

Results: Bedtime procrastination was associated with later activity (M10, $\beta = 0.42$, $p = 0.005$; up mesor, $\beta = 0.36$, $p = 0.001$) and rest periods (L5; $\beta = 0.55$, $p < 0.001$; down mesor, $\beta = 0.48$, $p < 0.001$), as well as later peak activity timing (acrophase; $\beta = 0.43$, $p < 0.001$) at the between-persons level. Individual differences in bedtime procrastination were also associated with poorer fit of observed RARs (pseudo R²; $\beta = -0.27$, $p = 0.034$). There were no significant associations between bedtime procrastination and shape (mesor, amplitude) or stability (IS, IV) indices. Associations between bedtime procrastination, L5, acrophase, and down mesor remained significant after statistically adjusting for DLMO, but associations were no longer significant after adjusting for chronotype.

Conclusion: Individual differences in bedtime procrastination were associated with later circadian rest-activity rhythms. Contrary to expectations, bedtime procrastination was not associated

with disruptions in RAR shape or stability. Our findings suggest that there are overlapping, yet still unique, profiles of RARs associated with bedtime procrastination, circadian phase, and chronotype.

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0016

DIURNAL NASAL GENE EXPRESSION IN CHILDREN

Weston Powell¹, Maria Kang², Ana Jahn³, Lindsay Clark³, Jade Turner³, Jason Debley³, Maida Chen⁴

¹Seattle Children's Research Institute, Center for Respiratory Biology and Therapeutics, ²University of Washington, ³Seattle Children's Research Institute, ⁴Seattle Children's Hospital/University of Washington

Introduction: Nasal symptoms of rhinitis and inflammation increased in the evening and overnight. However, the molecular basis for increased nasal mucus production and rhinitis symptoms has not been explored. We hypothesized that nasal gene expression would show diurnal variation that correlates with symptoms of rhinitis and is altered in the setting of pediatric obstructive sleep apnea (OSA).

Methods: Nasal swabs were obtained at the start and end of diagnostic polysomnography (PSG) in children referred for PSG from a single pediatric sleep center. Children were classified as healthy if AHI on PSG was $< 1.5/\text{hr}$, mild OSA for AHI 1.5-4.9/hr, moderate OSA 5-10/hr, and severe $> 10/\text{hr}$. RNA was isolated on swabs from 6 healthy children and 22 children with OSA (1 mild, 4 moderate, 4 severe) and analyzed using RNA-sequencing. Limma was used to identify genes with differential expression based on time of sample (PM for pre-PSG or AM for post-PSG) or for diagnosis of OSA. Weighted gene co-expression network analysis (WGCNA) identified 4 modules of gene expression that were analyzed using fgsea for enriched molecular pathways.

Results: We identified 4,569 with differential gene expression in the morning vs evening in both healthy children and children with OSA. Analysis for an interaction effect, identified 80 genes differentially expressed in the morning in children with OSA as compared to children without OSA. Modular analysis of gene expression identified 2 modules with increased expression in the morning and 2 modules with increased expression in the evening. Modules with increased expression in the evening included genes related to protein translation, oxidative phosphorylation, ribosomal RNA processing, and mucus production. Modules with increased expression in the morning included genes related to inflammatory signaling, immune cell chemotaxis, and olfactory receptor signaling. Increasing severity of OSA was associated with diminished diurnal differences in gene expression as compared to samples from those without OSA.

Conclusion: Time of day alters nasal gene expression with increased expression of immune signaling and chemotaxis genes in the morning and increased expression of metabolism, protein translation, and protein secretion genes in the evening.

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0017

INTERPLAY OF SLEEP DEPTH AND CIRCADIAN MISALIGNMENT ON CARDIAC AUTONOMIC MODULATION IN ADOLESCENTSAnthony Rahawi¹, Natasha Morales-Ghinaglia², Jidong Fang¹, Susan Calhoun³, Alexandros Vgontzas¹, Duanping Liao¹, Edward Bixler¹, Julio Fernandez-Mendoza⁴¹Penn State College of Medicine, ²Geisinger Commonwealth School of Medicine, ³Penn State Health, ⁴Penn State University, Hershey

Introduction: We previously showed that the odds ratio product (ORP), an EEG measure of sleep depth, is associated with lower heart rate variability (HRV), an EKG measure of cardiac autonomic modulation (CAM), in adolescents. Specifically, ORP was associated with decreased low-frequency HR oscillations (Log-LF) and decreased standard deviation between normal sinus rhythms (SDNN). In addition, circadian misalignment, as measured by a delayed sleep midpoint (SM), high sleep irregularity (SI) or high social jetlag (SJL), has also been shown to impact HRV. However, the interplay of sleep depth and circadian misalignment on CAM has not been previously evaluated.

Methods: We studied 344 adolescents from the Penn State Child Cohort (Md age=16y; 47% female, 23% racial/ethnic minority) who had at least 3 valid nights of actigraphy. We extracted ORP during NREM sleep from 9-hour, in-lab polysomnography (PSG). Log-LF and SDNN were extracted from Holter EKG monitoring during the 24-h after PSG. SM, the intra-individual mean middle point of the sleep period, SI, the intra-individual standard deviation of SM, and SJL, the intra-individual weekends vs. weekdays difference in SM, were extracted from actigraphy. Multivariable linear regression models examined the interactions between ORP and circadian indices with 24-h Log-LF and SDNN. Covariables included sex, age, race/ethnicity, obesity, metabolic syndrome, PSG-measured sleep apnea, insomnia symptoms, and actigraphy-measured mean sleep duration.

Results: The interaction terms between ORP and SI on 24-h Log-LF ($p=0.002$) and SDNN ($p=0.046$) were statistically significant. Specifically, higher ORP was associated with lower Log-LF [$B=-0.161$ (0.046), $p<0.001$] and SDNN [$B=-5.299$ (1.941), $p=0.007$] amongst those with high SI (>45 minutes; $n=183$), while ORP was not significantly associated with HRV indices among those with low SI (both $p>0.591$; $n=161$). No significant interactions were observed between ORP and either SM or SJL on HRV (all $p>0.10$).

Conclusion: A highly irregular timing of sleep impacts the association between sleep depth and CAM in adolescents. These data support the synergistic adverse effect between circadian misalignment and homeostatic dysregulation on heart health. Future studies should examine whether these associations are further impacted by entrainment to the academic school schedule.

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0018

PROSPECTIVE ASSOCIATIONS BETWEEN REST-ACTIVITY RHYTHMS AND CHANGES IN BLOOD PRESSURE ACROSS MID TO LATE ADOLESCENCEMichael Kaye¹, Donghan Su¹, Karen Peterson¹, Helen Burgess¹, Cathy Goldstein¹, Peter Song¹, Jonathan Mitchell², Mara Tellez-Rojas³, Alejandra Cantoral⁴, Libni Torres-Olascoaga³, Erica C. Jansen¹¹University of Michigan, ²Children's Hospital of Philadelphia, ³National Institute of Public Health (INSP), ⁴Iberoamerican University

Introduction: Delayed sleep timing has been associated with higher blood pressure among adolescents. However, rest-activity rhythms (RAR), which incorporate both sleep and physical activity, have been rarely explored.

Methods: The dataset included 558 adolescents (mean age 13.98, SD = 2.15) from the Mexico City-based ELEMENT cohort. Participants completed 7-day wrist actigraphy at the adolescent baseline (T1) visit. R package GGIR was used to derive RAR variables (Amplitude, IS, IV, Up Mesor, Down Mesor, Mesor, L5, L5 time, M10, M10 time, Acrotime, and Relative Amplitude). Blood pressure (systolic, SBP; and diastolic, DBP) was measured at two time-points approximately two years apart (T1 and T2). Linear regression models with RAR variables as continuous exposures and changes in SBP/DBP as outcomes, were adjusted for confounders. Sex stratified models were also tested. False detection rates (FDR) were controlled with the Benjamini Hochberg method.

Results: We found several associations related to timing of activity. Later L5 ("least active 5 hours") starting time was associated with positive two year increases in DBP (Beta = 0.265 with SE 0.07 and $P < 0.001$) and higher SBP (Beta = 0.191, SE 0.08; $P = 0.017$). In contrast, later Up Mesor (transition from lower to higher activity) was associated with negative two-year changes in SBP and DBP (Beta=-0.37, SE 0.16; $P=0.02$; and Beta=-0.40, SE 0.14; $P=0.003$, respectively). Similarly, later M10 (most active 10 hours) was associated with negative two-year changes in SBP (Beta = -0.727, SE 0.20; $P < 0.001$) and DBP (Beta = -0.709, SE 0.23; $P = 0.002$). All DBP associations remained significant with FDR adjustment. Finally, there were sex differences, such that the M10 association was more prominent in males and the L5 and Up Mesor associations were more prominent in females.

Conclusion: We found associations between timing of activity throughout the 24-hour day, but not other RAR metrics, with prospective changes in blood pressure. In line with prior research, later low activity periods (i.e., sleep) associated with higher blood pressure. In contrast to expectation, later timing of higher activity periods associated with relative reductions in blood pressure over time in a sex-specific manner.

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0019

INFLUENCE OF CAFFEINE AND ALCOHOL USE ON PHASE ANGLE IN YOUNG ADULTSKatie McCullar¹, Andrew McHill², Laura Barger³, Akane Sano⁴, Rebecca Robbins³, Melissa St. Hilaire⁵, Rosalind Picard⁶, Andrew Phillips⁷, Elizabeth Klerman¹¹Massachusetts General Hospital, ²Oregon Health & Science University, ³Division of Sleep Medicine, Harvard Medical School, ⁴Department of Electrical and Computer Engineering, Rice University, ⁵Merrimack College, ⁶MIT Media Laboratory, ⁷College of Medicine and Public Health, Flinders University

Introduction: Alignment between circadian and sleep timing (“phase angle of entrainment”, PAE) is defined as the difference in time between dim light melatonin onset (DLMO) and sleep onset. We and others have identified significant sex differences in PAE. It is important to determine whether modifiable behavioral factors, like caffeine and alcohol use, contribute to these sex differences. Caffeine and alcohol use differ by sex and influence circadian rhythms and sleep timing, making them plausible mechanisms through which sex differences in PAE may arise. In this study, we examined the extent to which self-reported caffeine and alcohol use in young adults contribute to variations in PAE and whether these associations differ by sex.

Methods: 118 college students (54% female) from a single university participated in this hybrid, in-laboratory/at-school ~30-day study. Sleep timing and Sleep Regularity Index (SRI) were calculated using actigraphy and sleep diaries. During the 30 days, circadian timing (salivary DLMO) was assessed once, and caffeine and alcohol use were determined using ~7-day photographic food diaries. Multiple linear regression models were performed with PAE as the outcome variable, and sex (M or F), caffeine use (yes/no), alcohol use (yes/no), and SRI as predictor variables.

Results: There were no sex differences in caffeine or alcohol use in this dataset. Caffeine use was associated with larger PAE ($\beta=0.96$, $p=0.045$; Yes Caffeine=3.4 h $\pm$ 1.4 h; No Caffeine=2.5 h $\pm$ 1.3 h), ii) Lower SRI was associated with larger PAE ($\beta=-0.03$, $p=0.03$), iii) Sex ($p=0.11$) and alcohol use ($p=0.96$) were not significant predictors in this multivariate model.

Conclusion: College students in our sample who consumed caffeine or had less regular sleep had (on average) a larger PAE. A larger PAE may have meaningful consequences for students: misalignment between internal circadian rhythms and scheduled activities can impair learning, cognitive performance, and overall health. Sex differences in PAE were reported previously in this data set; this effect was not a significant predictor in the current models that included caffeine, alcohol use, and sleep regularity. Therefore, behavioral factors such as caffeine use and sleep regularity may contribute to some of the sex-related variability in PAE.

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0020

ADAPTIVE AVOIDANCE: AN ULTIMATE EVOLUTIONARY FRAMEWORK FOR SLEEP AND TEMPORAL NICHE SPECIALIZATION

Andrew Freiberg

Pennsylvania State University

Introduction: Sleep-like states occur across organisms, including plants and animals lacking a centralized nervous system. This ubiquity challenges restorative theories—such as energy conservation, cellular repair, or memory consolidation—that rely on complex biology and neural architecture and cannot explain sleep-like behaviors in plants or lower-order animals. Adaptive theories (e.g., sleeping to avoid nocturnal danger) offer insight but do not explain why evolution imposes a recurring, obligate state of inactivity. This project proposes a broader evolutionary model in which sleep functions as a proximate mechanism enforcing temporal niche specialization across taxa.

Methods: A narrative evolutionary and comparative analysis was conducted using findings from sleep biology, chronobiology, plant physiology, and behavioral ecology. Cross-kingdom patterns of diurnal and seasonal adaptation were examined to identify selective pressures arising from predictable environmental cycles.

Results: All organisms face periodic environmental changes—day/night or seasonal shifts—that require distinct physiological and behavioral strategies. Plants exhibit diurnal leaf movements, changes in photosynthetic activity, and nighttime metabolic reallocation, reflecting sleep-like states despite the absence of a nervous system. Simple animals likewise display cycles of quiescence inconsistent with neural-dependent restorative explanations. Seasonal adaptations such as migration, hibernation, torpor, estivation, honeybee physiological shifts, and plant abscission demonstrate a shared evolutionary need: preventing maladaptation to incompatible ecological niches. Diurnal cycles create analogous pressures on a much shorter timescale. Adaptive theories suggest that organisms sleep to avoid (for example) nocturnal hazards; however, such explanations do not account for nocturnal behavior and why evolution mandates an internally generated, rhythmic state change rather than flexible behavioral avoidance.

Conclusion: Adaptive Avoidance provides a unifying evolutionary explanation for sleep and sleep-like states across plants, and in animals with and without complex biological systems. By framing sleep as a mechanism for temporal niche specialization, this theory integrates physiological, ecological, and evolutionary observations and addresses limitations of restorative and traditional adaptive models.

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0021

ALTERED ASSOCIATION BETWEEN SLEEP DURATION AND NOCTURNAL HEART RATE VARIABILITY IN SHIFT WORKERSMinah Kim¹, Sang Ho Choi², Ha Young Lee¹, Jeong Eun Jeon¹, Jin Hyuk Yoo¹, Sung Hyun Kim¹, Jiyeon Shin³, Mincheol Seo⁴, Kyung Hwa Lee¹, Seog Ju Kim⁵, Yu Jin Lee¹¹Seoul National University Hospital, ²Kwangju University, ³SMG-SNU Boramae Medical Center, ⁴UiJeongbu Eulji Medical Center, ⁵Samsung Medical Center

Introduction: Shift work disrupts sleep and circadian rhythm, potentially impairing cardiac autonomic regulation. This study aimed to examine whether the relationship between sleep or circadian rhythm parameters and nocturnal heart rate variability (HRV) differs between shift workers (SW) and non-shift workers (controls), and to explore sleep pattern indices within the SW group that are associated with altered autonomic activity reflected in nocturnal HRV.

Methods: Fifty-four SW and 41 controls underwent nocturnal polysomnography (PSG), sleep-wake assessment including sleep diary and actigraphy. Two-week actigraphy and sleep diary recordings were used to derive sleep and circadian rhythm parameters. In addition, self-report questionnaires on psychiatric symptoms were completed. Moderation analyses were performed to test whether shift-work status modulated associations between N2 HRV indices and sleep or circadian measures. Subsequent factor analyses in SW group examined associations between sleep diary-derived sleep pattern indices (e.g., total sleep time (TST) variability, bout/TST) and N2 HRV.

Results: No significant differences were observed in N2 HRV indices between shift workers and controls. Shift work significantly moderated the relationship between actigraphy-derived TST and normalized LF, normalized HF, and Ln-LF/HF (all p s < 0.001, p FDRs < 0.001). However, it did not moderate significantly the relationship between circadian measures and HRV parameters. Within the SW group, high bout/TST ratio based on sleep diary was associated with increased pNN50 (p = 0.014).

Conclusion: The findings suggest that prolonged or segmented sleep in shift workers may reflect compensatory rather than restorative sleep, accompanied by heightened sympathetic activation and reduced HRV stability during N2 sleep. Although it should be interpreted cautiously, HRV in shift workers may be related to sleep deprivation rather than circadian disturbances. A comprehensive assessment of sleep quantity and quality may therefore be crucial for identifying and preventing autonomic dysregulation in shift workers.

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0022

ASSOCIATIONS OF CIRCADIAN SHIFTS IN HEART RATE PHASE WITH HUMAN DISEASE IN THE ALL OF US RESEARCH PROGRAM

Zachary Chan, Priya Patel, Seyed Mehdi Nouraie, Neil Kelly
University of Pittsburgh School of Medicine

Introduction: An individual's day or night preference, known as chronotype, has been linked to numerous health outcomes and is thought to influence these outcomes through changes in circadian timing. However, continuous circadian measures related to chronotype have not been examined in large human cohorts. Here, we quantified wearable-derived heart rate phase (HRP) as an indicator of chronotype-relevant circadian shifts and determined its associations with human diseases.

Methods: Heart rate was binned over 5-minute intervals in All of Us participants with wearable data and fit to a sine curve with 24-hour period to determine HRP. Phenome-wide association study (PheWAS) was performed by multiple logistic regression. One-sample Mendelian randomization (MR) was performed by 2-stage residual inclusion.

Results: Average HRP was 9.48 ± 1.57 hours ($N=15,960$). PheWAS identified associations of later HRP with addiction, mood, sleep, and metabolic disorders, while certain conditions of pregnancy were associated with earlier HRP. In focused analyses of type 2 diabetes mellitus (T2DM), later HRP was associated with increased T2DM risk (OR 1.09 [1.06,1.13], $P=1.58 \times 10^{-7}$). The morningness genomic variant rs1144566(T) was associated with decreased HRP

($P=1.38 \times 10^{-7}$) and decreased risk of T2DM (OR 0.69 [0.55,0.88], $P=0.0027$). MR analysis suggested a causal effect of rs1144566 on T2DM risk through HRP.

Conclusion: We report the use of HRP as a quantitative longitudinal circadian metric. We combine HRP with phenomics, genomics, and EHR data to provide evidence for a relationship between circadian shifts and disease. HRP may hold clinical value as a circadian indicator.

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0023

CHRONONUTRITION AND PERINATAL MENTAL HEALTH: THE RELATIONSHIP BETWEEN FOOD INTAKE PATTERNS AND PRENATAL DEPRESSIVE SYMPTOMATOLOGY

Christina Personnette¹, Namhum Kim¹, Kaleab Abebe¹, Patrick Catalano², Tina Costacou³, Christina Scifres⁴, Esa Davis¹, Marquis Hawkins¹

¹University of Pittsburgh, ²Harvard Medical School, ³University of Pittsburgh School of Public Health, ⁴Indiana University School of Medicine

Introduction: Perinatal depression is a leading contributor to maternal morbidity, affecting 20% of pregnancies. While food intake timing has been associated with depression in adults, its role during pregnancy is underexplored. Our aim is to examine the cross-sectional association between mid-pregnancy (24-28 weeks' gestation) food timing profiles and depressive symptomatology.

Methods: This is a secondary data analysis of the Comparison of Two Screening Strategies for Gestational Diabetes (GDM2) trial (N = 719). Latent profile analysis was used to identify food timing profiles based on four food timing indicators: timing of first/last eating episode, total eating window, and caloric midpoint time obtained from 24-hour dietary recalls. Prenatal depression was defined as an Edinburgh Postnatal Depression score >10. Log-binomial regression was used to examine the association between mid-pregnancy food timing profiles and prenatal depressive symptomatology, adjusting for known covariates (e.g., insomnia symptoms, maternal age, stress, education, etc.).

Results: We identified four unique food timing profiles. The "early eating" profile (n = 210) began/ended eating at 7:45 AM-7:30 PM with caloric midpoint at 1:30 PM and an eating window of 11.6 hours. The "daytime eating" (n = 222) profile had the latest caloric midpoint (3:30 PM) and a typical eating window (M = 11.8-hour). The "extended window" profile (n = 151) had the earliest first intake and the longest eating window (M = 14.5 hours). The "restricted eating" profile (n = 136) had the latest first intake and shortest eating window (M = 8.8 hours). Participants with an extended window eating profile (vs. early eating profile) had a 63% higher risk of depression (95% CI 1.11-2.42). There were no statistically significant differences between the early eating and the daytime eating (RR = 1.41, 95% CI 0.95-2.08), and restricted window (RR = 1.16, 95% CI 0.74-1.80) profiles.

Conclusion: Results support previous literature reporting associations between later eating times and depression. The timing of food intake is an important factor in assessing depressive symptoms during the prenatal period.

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0024

CIRCADIAN PHASE RESPONSE TO SHIFT WORK: THE ROLE OF LIGHTYijun Ji¹, Linda Shen¹, Svetlana Postnova², Stuart Knock², Yichen Zhong¹, Mark Howard³, Julia Stone⁴, Elise Facer-Childs¹, Shantha Rajaratnam⁵, Tracey Sletten¹¹Monash University, ²University of Sydney, ³Austin Health, ⁴University of Melbourne, ⁵School of Psychological Sciences, Monash University

Introduction: Shift workers exhibit substantial individual variability in circadian response to work rosters. Light exposure has been shown to explain a considerable proportion of this variability during night shifts. This study aims to explore the predictive role of light exposure for circadian timing across diverse roster patterns.

Methods: Thirty-eight shift workers (37.16±9.06 years, 18 females) were monitored during a usual 6-day roster. Roster patterns included consecutive night shifts, consecutive early morning shifts, early morning-to-night rotations and night-to-early morning rotations. Sleep-wake timing was assessed using daily sleep diaries and wrist actigraphy. Circadian phase was assessed on the first and last day of the roster via 6-sulphatoxymelatonin (aMT6s) acrophase (peak) in urine. Light exposure was continuously measured via a lapel-worn light sensor. The difference in light intensity between the main phase advance (3-7h after acrophase) and phase delay zones (3-7h before acrophase) of the light circadian phase response curve was calculated across 6 days. Phase advance/delay zones were adjusted daily to account for individual phase shifts.

Results: Substantial individual variability was observed in the magnitude and direction of phase shifts across roster patterns (mean magnitude of shift = 1.76 ± 1.45 h; range = -6.57 to +3.21 h). Following consecutive night shifts, aMT6s phase shifts varied from -5.13 h to +1.17 h (mean = -1.81 ± 1.74 h, 10 delay, 1 advance). Following consecutive morning shifts, aMT6s phase shifts varied from -5.41 h to +3.21 h (mean = +0.70 ± 1.82 h, 7 advance, 2 delay). The difference in light exposure between the advance and delay zones across 6 days significantly predicted the degree of phase shift in either direction ($\beta = 0.001$, $p = .01$, $R^2 = .16$). Including diurnal preference improved the model to explain 31% of the variance (adjusted $R^2 = .31$).

Conclusion: Findings highlight that individual variability in circadian phase responses to various roster patterns was partly explained by differences in light exposure during the critical periods of the light phase response curve. This research supports the prediction of circadian timing to inform personalised interventions for shift workers.

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0025

INTERFERON-RELATED DAMPENING OF CIRCADIAN RHYTHMS IN AIRWAY EPITHELIAAna Jahn¹, Maria Kang², Jason Debley¹, Weston Powell³¹Seattle Children's Research Institute, ²University of Washington, ³Seattle Children's Research Institute, Center for Respiratory Biology and Therapeutics

Introduction: Molecular circadian rhythms regulate cellular processes underlying health including innate immune pathways. Prior studies have indicated that viral infections abolish circadian rhythms in the airways of mice, but investigation in human cell models of airway epithelium has been limited. Using primary human airway epithelial cells differentiated at an air-liquid interface as an ex vivo organotypic model from healthy donors and donors with asthma, we investigated circadian rhythms in airway epithelial cells and the response to interferon stimulation.

Methods: Primary airway epithelial cells (AECs) from healthy donors (n=7) and donors with pediatric asthma (n=2) were differentiated at an air-liquid interface to an organotypic epithelium in temperature cycled incubators. Intrinsic circadian rhythmicity following temperature cycling was confirmed using BMAL1:Luciferase recordings and western blotting for BMAL1. At circadian time 0 hours and circadian time 12 hours, interferon-beta (10ng/mL) or polyI:C as a viral mimic was added to the media. BMAL1:Luciferase recordings were obtained from 5 days of continuous recording.

Results: Temperature cycles of 12 hours at 37C and 12 hours at 34C for 6 days reliably synchronized intrinsic circadian rhythms measured in luciferase assays in AECs. Circadian amplitude and period was similar between healthy AECs and AECs from donors with asthma by gene expression and BMAL:Luciferase recording. Treatment with interferon-beta or polyI:C did not alter circadian period or phase, but reduced BMAL:Luciferase amplitude by 50%.

Conclusion: The core circadian clock genes maintain rhythmicity in healthy and asthma airway epithelia. Interferon stimulation or polyI:C stimulation as a viral infection mimic reduces amplitude of circadian rhythmicity. Future work will investigate reduced circadian rhythmicity with altered innate immune signaling.

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0026

LATER SLEEP-WAKE/DARK-LIGHT TIMES PROMOTE LATER CIRCADIAN PHASE INDEPENDENT OF SLEEP REGULARITYMelissa St. Hilaire¹, Leilah Grant², Cassie Hilditch³, Charles Czeisler⁴, Shadab Rahman², Elizabeth Klerman⁵¹Merrimack College, ²Brigham and Women's Hospital and Harvard Medical School, ³Central Queensland University, ⁴Brigham and Women's Hospital, ⁵Massachusetts General Hospital

Introduction: Although irregular sleep-wake patterns are associated with delayed circadian phase, it remains unknown whether the irregular sleep-wake patterns themselves or their associated dark-light patterns are primarily responsible.

Methods: Twenty-seven healthy participants (9 females; ages 19-35 y) completed a 26-day inpatient study consisting of: (i) one 24-hour baseline day; (ii) 21 days on a randomized Early Regular (ER), Late Regular (LR), or Irregular (IR) sleep-wake/dark-light schedule; (iii) a 30-hour interval of 90-minute "ultradian days"; and (iv) a final recovery day. Each randomized schedule was based on observed schedules from a study in college students. Schedules were selected for regularity as defined by a Sleep Regularity Index >80 (ER and LR schedules) or <60 (IR schedule) and for timing as either Early (ER, scheduled sleep midpoint mean±SD: 3:57±0:39) or Late (LR: 6:29±0:40; IR: 7:01±1:58). Change in circadian phase

was calculated as the difference in dim light melatonin onset (DLMO) between day 1 (prior to sleep-schedule intervention) and day 23 (after sleep-schedule intervention).

Results: There was a significant effect of schedule on circadian phase ($p=0.005$); phase was more delayed following LR (-2.90 ± 2.31 h) and IR (-1.54 ± 4.75 h) compared to ER (0.23 ± 1.41 h, $p=0.001$ and $p=0.04$, respectively) with no difference between LR and IR ($p=0.25$). There was a significant effect of schedule ($p=0.0005$) on light exposure in the phase advance region (measured by area under the curve [AUC] of photopic illuminance from 6 h to 15 h after DLMO): the AUC was significantly higher for ER compared to LR ($p=0.007$) and IR ($p=0.0005$) but not different between LR and IR ($p=0.37$). Light in the phase delay region (AUC of photopic illuminance from 3 h before to 6 h after DLMO) trended towards but did not reach significance across the three schedules ($p=0.07$).

Conclusion: LR and IR schedules had later circadian phase and less phase advancing light compared to ER schedules, suggesting that later circadian phase in late and irregular schedules is due primarily to the temporal pattern of light exposure independent of sleep regularity.

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0027

NO EVIDENCE FOR SEX DIFFERENCES IN THE HUMAN PHASE RESPONSE CURVE TO A 6.5-HOUR LIGHT EXPOSURE

Leilah Grant¹, Kritika Vashishtha¹, Melanie Rüger¹, Shauni Omond¹, Melissa St. Hilaire², Steven Lockley¹, Shadab Rahman¹

¹Brigham and Women's Hospital and Harvard Medical School,

²Merrimack College

Introduction: It has been reported that women have a shorter circadian period, larger phase angle of entrainment, and more light-exposure induced melatonin suppression than men. Whether these sex differences extend to photic resetting of the central circadian pacemaker remains unknown. We examined whether the properties of phase response curves (PRCs) to light exposure differed between men and women.

Methods: Twenty-six adults (12 female), aged 19–33 years, completed an inpatient protocol consisting of: 1) an initial circadian phase assessment during a constant routine (CR), involving continuous wakefulness in a semi-recumbent posture under dim light (< 3 lux) with hourly isocaloric snacks; 2) a 6.5-hour light exposure centered within a 16-hour intervention day; and 3) a final circadian phase assessment during a subsequent CR. The timing of the 6.5-hour exposure was randomized systematically between participants so that exposures were distributed across the 24-hour circadian cycle. Data were pooled from two studies with near-identical inpatient protocols that implemented either a 6.5-hour monochromatic short-wavelength light exposure (480 nm, $n=16$, 2.8×10^{13} photons/cm²/s, 11.2 lux) or a 6.5-hour polychromatic light exposure (4100K, $n=10$, 2.6×10^{15} photons/cm²/s, 3,200 lux). Dim light melatonin onset (DLMO) was calculated by interpolating the time at which plasma melatonin reached 10 pg/mL. Phase shifts were calculated as the difference in timing of DLMO between CR1 and CR2. PRCs were generated by fitting a single-harmonic regression to phase shifts expressed as a function of the onset of light exposure relative to CR1 DLMO.

Results: Both men and women exhibited significant PRCs, with typically-timed phase delays and advances when light exposure

occurred in the early biological night or early biological morning, respectively. There were no significant sex differences in the amplitude (men: 2.0, 95% CI [1.7, 2.5]; women: 2.1, 95% CI [1.6, 2.3] hours) or the crossover point (men: 6.3, 95% CI [5.6, 7.0]; women: 7.3, 95% CI [6.6, 8.0] hours after DLMO) of the PRCs, including after correction for the expected sex-specific drift in circadian phase (11 and 05 mins /day for men and women, respectively).

Conclusion: There was no evidence for sex differences in resetting of the central pacemaker by light.

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0028

POST ILLUMINATION PUPIL RESPONSE IS ASSOCIATED WITH CIRCADIAN TIMING IN HEALTHY ADULTS

Madeline Wary, Andrew McHill, Brooke Shafer
Oregon Health & Science University

Introduction: Greater variability in day-to-day sleep timing (i.e., sleep regularity) is associated with later circadian phase, potentially through increased variability in the timing of light exposure across the day. In humans, the circadian timing system is entrained via light exposure transmitted from the eye to the brain by intrinsically photosensitive retinal ganglion cells (ipRGCs). The post-illumination pupillary response (PIPR) is one method used to measure the light-based activity of ipRGCs and has been shown to be greater in individuals with later sleep timing. However, the extent to which PIPR may be impacting circadian timing and sleep regularity is unclear. We therefore assessed the association between circadian timing, sleep regularity, and PIPR in healthy adults.

Methods: Eighteen ostensibly healthy volunteers (12F; aged [mean $\pm$ SD] 29 $\pm$ 7y) underwent an in-laboratory stay that began with a PIPR assessment followed by ~8h evening salivary melatonin collection in dim-lighting (< 5 lux). Following the in-laboratory stay, participants recorded a daily sleep-wake diary for ~14-days to capture sleep regularity. PIPR was determined using a blue- and red-light stimulus following a 10-minute dark adaptation period and quantified as the percentage change between baseline pupil diameter and the pupil diameter 6-seconds post-stimulus. Circadian phase was determined via salivary dim-light melatonin onset (DLMO; 3pg/ml threshold) and sleep regularity was assessed using the standard deviation (SD) of diary-determined sleep onset across the ~14 days. The associations between DLMO, SD sleep onset, and PIPR were assessed using unadjusted linear models.

Results: On average, participants had a DLMO of 20:10 $\pm$ 1:04, sleep onset of 24:05 $\pm$ 1:34, and a SD sleep onset timing of 1.11 $\pm$ 0.47h. Later DLMO was associated with greater PIPR sensitivity (effect: 4.2%; $p=0.014$); however, there was no significant association between SD sleep onset timing and PIPR ($p=0.7$).

Conclusion: We found that a later circadian phase was associated with a greater sensitivity to light in healthy adults, with no significant relationship between sleep regularity and light sensitivity. While directionality of the significant relationship is unclear, these findings may suggest that sleep regularity has limited impact on light sensitivity and thus the observed delayed phase via irregular sleep schedules may be driven by a different mechanism (i.e., differing light exposure patterns).

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0029

READING THE CLOCK THROUGH THE HEART: CIRCADIAN MODULATION OF HEART RATE IN SLEEP DISORDERSLais Mota¹, Henrique Terceiro², Gabriela Brito², Paula Alana Morais Seixas², Miguel Cruz³, Cristina Salles¹¹Escola Bahiana de Medicina e Saúde Pública, ²Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ³Universidade de Portugal

Introduction: Introduction: The circadian rhythm exerts direct control over autonomic tone and, consequently, over heart rate (HR), producing an expected pattern of nocturnal HR reduction (dipping) and morning elevation. Alterations in this profile—whether due to sleep disorders, sleep fragmentation, or circadian misalignment—suggest a decoupling between the biological clock and the cardiovascular system. Objective: To evaluate the association between the circadian rhythm, heart rate (HR), and oxygen saturation (SpO₂) in patients with Obstructive Sleep Apnea (OSA).

Methods: Methods: This was a cross-sectional study nested within a cohort, evaluating 36 individuals, 58.1% of whom were women, with a mean age of 53.95 ± 11.86 years. Patients diagnosed with OSA were included, and the following measures were collected: HR, SO₂, and data from the Morningness-Eveningness Questionnaire for Sleep Apnea (MEQ-SA).

Results: Results: The mean score for the MEQ-SA was 22.4 ± 4.8. We divided the sample into two blocks: the first composed of individuals scoring above 22 and the second of individuals scoring below 22 on this questionnaire. The results for the two blocks (Above 22 vs. Below 22) were: Minimum HR (56.67 ± 6.40 vs 49.31 ± 5.76), Mean HR (72.44 ± 8.95 vs 68.46 ± 10.15), Maximum HR (109.22 ± 9.80 vs 110.69 ± 13.22), ΔHR (36.78 ± 8.06 vs 41.77 ± 13.22), Minimum SO₂ (83.89 ± 5.01 vs 81.08 ± 15.09), and Mean SO₂ (93.56 ± 2.50 vs 93.54 ± 7.30).

Conclusion: Conclusion: The systematic incorporation of heart rate rhythm into sleep disorder assessment transforms HR from a static vital sign into a biomarker of circadian organization. Patterns such as the absence of nocturnal HR dipping, persistent tachycardia during sleep, or a phase shift in HR can signal autonomic vulnerability and a mismatch between the biological clock and the cardiovascular system, with potential prognostic impact.

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0030

RHYTHMS OF COLLAPSE: THE INFLUENCE OF CIRCADIAN RHYTHMS ON CARDIORESPIRATORY ARRESTSMahathi Mudigonda, Karthy Thiagarajan, Kimberly Persaud Shewnarain, Sreelatha Naik
Geisinger

Introduction: The circadian pattern of occurrence of cardiovascular events is an evolving field of research. Sympathetic signaling can increase risk of fatal arrhythmias in patients with cardiovascular disease. Circadian rhythm regulated peak secretion of cortisol, a key modulator in sympathetic signaling, occurs at 07:00 to 08:00. Our study aims to identify incidence of in-hospital cardiorespiratory arrests and evaluate for associations with timing.

Methods: Patients age > 18 who had cardiac arrest in three campuses of Geisinger Health System between January and June of 2025, documented in the Geisinger Code Blue Dashboard, were included. This encompassed in-hospital events and out of hospital arrests that continued in the emergency department. Retrospective review evaluated age, gender, clinical history (obstructive sleep apnea, heart failure, hypertension, coronary artery disease), and timing of arrest. At least twenty minutes was required between events to count as separate events in the same individual. The timing of cardiorespiratory events was the primary outcome.

Results: 162 patients were identified for preliminary analysis. The average age was 60.7 years (range 43-77). 59.3% (n = 96) were male. 18.52% had OSA (n = 30 patients), 67.28% (n = 109 patients) had hypertension, 45.06% (n = 73 patients) had CAD, 32.72% (n = 53 patients) had heart failure. Of 176 recorded events, 47.7% (n = 84) occurred prior to noon and 59.7% (n = 92) occurred after noon. 29.5% of events occurred between window of 08:00 and 13:00 (n = 52) with peak of 10:00 (n = 14). Peak codes in males occurred between 10:00 and 17:00, whereas in females occurred between 08:00 and 14:00.

Conclusion: Our data indicates occurrence of cardiorespiratory arrests between 08:00 and 13:00 in the general population which aligns with timing of circadian related changes such as peak cortisol, inflammatory and thrombotic marker levels. While sex differences in timing of out-of-hospital events were previously attributed to emergency services activation, our data suggests that sex differences in timing of in-hospital events also exist. A confounding factor may be type of cardiac disease prior to onset of arrest. Further data is needed to explore the pathophysiological reasons for these sex differences and implications on in-hospital arrests.

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0031

SEX-SPECIFIC DIFFERENCES IN THE RELATIONSHIP BETWEEN GENERAL PAIN AND THE CIRCADIAN TIMING OF SLEEPSophia Kogan¹, Brooke Shafer¹, Steven Shea¹, Olson Ryan², Andrew McHill¹¹Oregon Health & Science University, ²University of Utah

Introduction: Pain and disrupted sleep have a bidirectional relationship such that pain impairs sleep and disrupted sleep increases pain perception. In males, acute pain exhibits circadian rhythmicity with a maximum during the night, but the relationships between sex, sleep timing, circadian phase, and pain remain underexplored. Thus, in both females and males with general pain, we examined the relationships between pain and sleep timing and between pain and sleep relative to circadian phase (i.e., phase angle of entrainment).

Methods: General pain levels over the previous week were assessed utilizing a 10-point scale (1=no pain, 10=worst pain imaginable) in 34 participants (15F). Sleep timing (bedtime, wake-time, and sleep duration) was measured using one-week sleep diaries. Dim-light melatonin onset (DLMO) was measured during an in-laboratory visit via saliva collection in dim light (lux < 5) between 1700 and 2300. Phase angle was calculated as the time duration between DLMO and average bedtime. Differences in pain, DLMO, and sleep timing between sexes were assessed using

independent t-tests, and the relationships between sleep timing, phase angle, and pain were assessed with Pearson correlation analyses.

Results: There were no significant differences between females and males in pain levels (mean $\pm$ SD, Female vs. Male; 3.50 $\pm$ 1.77 vs. 3.97 $\pm$ 1.97, $p=0.47$), bedtime (23.20 $\pm$ 1.58 vs. 23.04 $\pm$ 1.36h, $p=0.74$), waketime (06.75 $\pm$ 1.50 vs. 06.26 $\pm$ 1.28h, $p=0.29$), DLMO (20.11 $\pm$ 1.27 vs. 19.61 $\pm$ 1.18h, $p=0.61$), or phase angle (2.81 $\pm$ 1.69 h vs. 3.43 $\pm$ 1.69h, $p=0.19$). Among females, phase angles were positively correlated with pain ($r=0.54$, $p=0.02$), such that a wider phase angle was associated with higher pain. Among males, phase angles were not correlated with pain ($r=0.19$, $p=0.50$); however, in a subset of males with moderate/severe pain, phase angles were negatively correlated with pain ($r=0.73$, $p=0.04$), such that a wider phase angle was associated with lower pain. There were no significant correlations in either group between pain and sleep timing, DLMO, or sleep duration.

Conclusion: We found sex-specific differences in the associations between circadian phase angle of sleep and pain levels in females and males. It is unclear what mechanism(s) is driving these differences, but with the relationship between pain and phase angle moving in opposite directions between sexes, future work is warranted.

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0032

SOME SLEEP AND CIRCADIAN OUTCOMES FOLLOWING THE SPRING DAYLIGHT SAVING TIME TRANSITION AMONG A COHORT OF URBAN/SUBURBAN SUBJECTS

Mark Rea, John Bullough, Mariana Figueiro
Icahn School of Medicine at Mount Sinai

Introduction: Periodically, concerns are raised about the effects of societally-mandated changes to and from daylight saving time (DST) on circadian and sleep-related outcomes. Arguments for or against changes to local clock time are sometimes based on limited outcome measures. The present study examined a range of circadian and sleep-related outcome measures with the aim of better understanding the spring DST transition's impact on circadian phase markers, sleep outcomes, and subjective sleepiness among a cohort of urban/suburban subjects living their normal lives.

Methods: Twenty healthy adult subjects (16F/4M, mean age 42 y [SD 13]) following their daily routine participated in the study, which ran from 26 February 2024 to 3 May 2024. Personal, calibrated light exposure devices were continuously worn during waking hours and wrist actigraphs were worn continuously except during bathing. The personal 24-h light-dark and the wrist activity-rest cycles were recorded for phasor analysis to assess circadian entrainment. The personal light-dark exposure patterns were used to predict minimum core body temperature (CBT_{minp}). The actigraph data were used to calculate mid-sleep. Dim light melatonin onset (DLMO) was assessed just before the transition to DST and 2 weeks after the transition. Subjects reported their levels of subjective sleepiness four times each day.

Results: 1) Local clock times of mid-sleep and of DLMO were not affected by the DST transition but CBT_{minp} was delayed after the DST transition. 2) The synchrony between the 24-h light-dark exposure pattern and the 24-h activity-rest pattern

was not affected by the DST transition. 3) Karolinska Sleepiness Scale score was heightened in the mornings just following the transition, but by the end of the first week morning sleepiness returned to the same levels as those before the transition.

Conclusion: 1) The spring transition to DST had modest effects on most circadian/sleep-related measures. 2) The temporal relationship between circadian phase markers was altered after the transition to DST. 3) Circadian entrainment was not affected by the DST transition. 4) Relatedly, subject activity was correlated with available light both before and after the DST transition even though the subjects spent most of their time indoors.

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0033

THE LONELINESS OF LATER CHRONOTYPES: A NIGHTTIME PATHWAY TO MENTAL HEALTH RISK

Alec Harlow, Karmen Smith, Marissa Woffinden
Brigham Young University

Introduction: Evening chronotypes often experience misalignment with societal schedules and increased feelings of isolation, particularly at night. Although loneliness and mental health difficulties are common in this group, the role of nocturnal loneliness remains unclear. This study examines how chronotype, nocturnal loneliness, and general loneliness relate to mental health.

Methods: Participants (N = 442) were recruited through Prolific and completed an online Qualtrics survey assessing demographics, chronotype: Morningness-Eveningness Questionnaire (MEQ), general loneliness: UCLA Loneliness Scale 3 (LS), nocturnal loneliness: Nocturnal Loneliness Scale (NLS), and self-rated mental health (0–100). Mediation analyses were conducted using PROCESS Model 4 to test whether NLS and LS independently mediated the association between chronotype and mental health rating. Parallel indirect effects were estimated using 5,000 bootstrap samples with 95% confidence intervals.

Results: Individuals with a later chronotype reported poorer mental health ($r = .33$), higher nocturnal loneliness ($r = -.22$), and higher general loneliness ($r = -.30$). In the full mediation model, both forms of loneliness were uniquely associated with poorer mental health (nocturnal loneliness: $b = -2.95$, $p = .001$; general loneliness: $b = -9.88$, $p < .001$). Both mediators contributed significant indirect effects: nocturnal loneliness (indirect = 0.063, 95% CI [0.020, 0.117]) and general loneliness (indirect = 0.279, 95% CI [0.180, 0.387]). The total indirect effect was significant (indirect = 0.342, 95% CI [0.229, 0.456]). The direct effect of chronotype on mental health remained significant ($b = 0.309$, $p < .001$), indicating partial mediation.

Conclusion: These findings demonstrate that individuals with a later chronotype experience poorer mental health partly because they report greater loneliness, including both general loneliness and loneliness experienced at night. Although both forms of loneliness mediated the chronotype–mental health association, general loneliness accounted for a larger portion of the indirect effect, while nocturnal loneliness contributed a smaller but still significant unique pathway. These results highlight the importance of considering both daytime and nighttime social experiences when examining mental health disparities among evening types. Assessing and addressing loneliness, particularly the challenges

that arise at night, may represent a meaningful intervention target for improving wellbeing in people with later chronotypes.

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0034

THE SOCIAL SIDE OF SLEEP: CHRONOTYPE, CO-SLEEPING, AND RELATIONSHIP HEALTH

Karmen Smith, Marisa Woffinden, Alec Harlow, Dustin Sherriff-Clayton, Daniel Kay, Kara M. Duraccio, Julianne Holt-Lunstad, Wendy Troxel
Brigham Young University

Introduction: Sleep and social connectedness are closely linked, and prior studies show that relationship functioning relates to both sleep quality and feelings of loneliness. Nocturnal loneliness—loneliness experienced at night—has been associated with poorer sleep and emotional well-being, yet little is known about couple-level contributors. Chronotype mismatch may be one such factor, as misaligned sleep-wake preferences can disrupt shared routines and interpersonal synchrony. We therefore examined whether chronotype mismatch within married couples is associated with higher nocturnal loneliness and poorer relationship quality.

Methods: Participants with a bed partner in the NOLO Survey Study (N=254) were recruited through Prolific and completed measures of demographics: age ($M=47\pm14$), sex (51% female), race (76% White), education (34% Bachelor's degree), marital status (73% married), and number of cosleeping nights, chronotype: chronotype of self and partner (morning, intermediate, evening) and the Morningness-Eveningness Questionnaire (MEQ), nocturnal loneliness: Nocturnal Loneliness Scale (NLS), relationship quality: Quality of Marriage Inventory scale for Relationship Quality (RQ), and self-reported ratings of mental, physical, and sleep health (0-100, with higher scores indicating better health for each). Six chronotype match groups based on self/partner category were created. We used Spearman's correlation coefficient to determine how chronotype, health, RQ, and NLS were related.

Results: Having evening chronotype and lower co-sleeping frequency were associated with poorer mental, physical, and sleep health, $\rho=.15$ -.33, $p=.05$ -.001, for all. Having a bed partner with evening chronotype was significantly related to the participant having poorer physical and sleep health, $\rho=.13$, $p<.05$, for both. Higher QR scores correlated with better mental health, $\rho=.20$, $p=.002$. Chronotype matching between partners was not significantly associated with any health outcome.

Conclusion: Overall, results indicate that evening chronotype and reduced co-sleeping frequency contribute more to poorer health and relationship functioning than chronotype similarity within couples. Chronotype matching did not explain differences in nocturnal loneliness or relationship quality, suggesting that individual sleep-wake preferences, rather than partner alignment, may be the more meaningful driver of well-being. These

findings highlight the importance of considering chronotype as an individual risk factor within couple contexts.

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0035

IMPROVING SLEEP WITH A BLUE-LIGHT BLOCKING AMBER LENSES INTERVENTION FOR COLLEGE STUDENTS WITH POOR SLEEP QUALITY

Dharmik Namineni, Jane Poinsette, Kate Batterson, Rachael Rice, Jonathan Conrady, Jessica Green, Alexandria Reynolds
University of South Carolina

Introduction: Evening blue light exposure from electronics can interfere with our natural circadian rhythm and disrupt sleep. College students commonly use electronics before bed, a behavior associated with poor sleep quality. Blue light-blocking glasses with amber lenses offer a non-invasive option to filter this light from our eyes and reduce its impact. Actigraphy-based studies show improvements in sleep metrics (total sleep time [TST], sleep efficiency, etc.) when amber glasses are worn before bed. Improvements in these objective sleep markers suggest amber glasses as an effective intervention for sleep quality improvement. This study aims to understand the effect of amber glasses on objective sleep metrics in college students with poor sleep quality.

Methods: Participants included 6 (male=3) full-time undergraduate students (mean age=19.83, SD=1.47 years) who reported poor sleep quality (global screening scores ≥ 5 and/or sleep efficiency scores $\leq 82\%$ on the Pittsburgh Sleep Quality Index). They completed one week of typical sleep (baseline), followed by two weeks wearing amber glasses two hours prior to bedtime. During the 3-week study, participants wore a wrist actigraph (Philips Respironics) to assess Time in Bed (TIB), TST, Sleep Onset Latency (SOL), sleep efficiency, Wake After Sleep Onset (WASO), and number of awakenings.

Results: Preliminary paired-samples t-tests were conducted. Both TIB (Baseline=484.3 min, Intervention=537.0 min, $t(5)=-4.871$, $p=.005$) and TST (Baseline=398.5 min, Intervention=447.5 min, $t(5)=-5.527$, $p=.003$) increased after the intervention. Although not statistically significant ($p=.312$), a moderate effect size ($d=0.458$) was observed for improved SOL (Baseline=24.6 min; Intervention=19.7 min). Differences were not statistically significant for sleep efficiency, WASO, or number of awakenings.

Conclusion: These pilot findings suggest that wearing amber-tinted glasses before bedtime may lead to increased time spent in bed and longer sleep duration. The moderate effect sizes for reduced SOL after intervention suggest that participants may fall asleep more easily with reduced blue light exposure. A potential mechanism may include improved melatonin timing to facilitate easier sleep onset. As reducing electronic use in college students is challenging due to academic, social, and personal factors, amber glasses may present a more feasible way to reduce blue light exposure before bedtime and enhance sleep health.

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0036

EFFECTS OF CIRCADIAN-BASED EARLY VS LATE DINNER ON WHOLE-BODY SUBSTRATE METABOLISM: PRELIMINARY RESULTS FROM A RANDOMIZED CROSSOVER STUDY

Daisy Duan¹, Sophia Glaros², Samson Cantor², Lilian Mabundo², Amber Courville², Asuka Ishihara², Robert Brychta², Athena Mauronis¹, Luu Pham³, Kong Chen², Stephanie Chung², Jonathan Jun¹

¹Johns Hopkins University School of Medicine, ²National Institute of Diabetes and Digestive and Kidney Diseases, ³Johns Hopkins

Introduction: Eating at times misaligned with endogenous circadian phase, such as consuming food close to dim light melatonin onset (DLMO) or bedtime increases risk for obesity and diabetes, but the drivers of the adverse metabolic effects are unclear. Using a timed dietary intervention, we evaluated the impact of circadian-misaligned late eating on whole-body substrate oxidation.

Methods: We are conducting a randomized, cross-over trial to compare DLMO-based early vs late isocaloric dinner on substrate oxidation using whole-room indirect calorimetry (i.e., metabolic chamber) in healthy adults. Participants undergo 2 inpatient stays in a metabolic chamber in random order: (1) early dinner (DLMO-3h); (2) late dinner (DLMO+1h), with an identical 8h sleep opportunity (DLMO+2h to DLMO+10h). The main outcomes include differences in 4h post-dinner area under the curve (AUC) for respiratory quotient (RQ), carbohydrate oxidation, and fat oxidation. As an exploratory outcome, we assess 24h metabolic flexibility, which is the ability to readily shift between fat and carbohydrate utilization in response to feeding or fasting. We defined 24h metabolic flexibility as the difference between the daytime mean RQ and sleep RQ. We used signed rank tests to compare between the conditions.

Results: To date, 10 healthy participants have completed the study (9 female, 1 male, mean (SD) age 24.9 (2.7) years, BMI 21.3 (1.1) kg/m²). Compared to early dinner, late dinner reduced post-dinner RQ by 0.12 [0.04] or 3.7 [1.2] % (median [IQR]; P=0.002) and carbohydrate oxidation by 0.19 [0.08] g/min or 28.2 [9.7] % (P=0.002). Furthermore, 24h metabolic flexibility was reduced with late dinner (P< 0.001), indicating blunted fuel switching between carbohydrate and fat.

Conclusion: Our preliminary findings reveal that eating after DLMO alters post-dinner fuel utilization patterns, characterized by reduced carbohydrate oxidation and metabolic flexibility. These results provide novel insights into how misalignment between meal timing and circadian rhythms may contribute to the development of type 2 diabetes.

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0037

TAILORED LIGHTING INTERVENTION IMPROVES SLEEP AND COGNITION IN INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT: IMPORTANCE OF MEASURING LIGHT DOSE

Mariana Figueiro¹, Weixin Li¹, Alessandra Shuster², Sara Mednick²

¹Icahn School of Medicine at Mount Sinai, ²University of California, Irvine

Introduction: Sleep disturbances are common in individuals with mild cognitive impairment (MCI) and are associated with worse cognition, mood, and risk of dementia progression. Our group previously showed that a tailored lighting intervention (TLI) designed to maximally affect the circadian system improves sleep and mood in individuals with Alzheimer's disease and related dementia living in controlled environment, but its impact in community-dwelling individuals with MCI remains unclear.

Methods: We conducted a randomized, placebo-controlled trial of a home-based TLI in adults with MCI and sleep disturbances (N = 61; mean age = 69.7 years). Participants were randomly assigned to receive either active or placebo lighting for 24 weeks, with assessments at baseline, weeks 13, 25, and 37. Outcomes included sleep quality (Pittsburgh Sleep Quality Index [PSQI]), actigraphy-based sleep metrics, mood (Geriatric Depression Scale [GDS]), quality of life (Dementia Quality of Life [DQoL]), and cognition (ADAS-Cog and Montreal Cognitive Assessment [MoCA]). Circadian-effective light exposure was measured using a Daysimeter and summarized as area under the curve (AUC) for morning circadian stimulus (CS). Analyses used intention-to-treat and instrumental variable models to estimate causal effects of achieved light exposure.

Results: The active condition produced greater improvement in ADAS-Cog memory scores versus placebo (p = 0.035) and a trend toward improvement in total ADAS-Cog (p = 0.142). Morning CS AUC was higher in the active group by week 25 (0.021 vs -0.030; p = 0.025). Higher light exposure was associated with better sleep outcomes at week 25, including percent sleep (-0.21 vs -1.29 percentage points; p = 0.042), percent wake (-0.10 vs 1.19 percentage points; p = 0.023), and wake after sleep onset (2.19 vs 8.23 minutes; p = 0.031). Effects at week 37 were similar but not statistically significant.

Conclusion: A home-based light intervention for individuals with MCI was feasible and showed potential benefits for memory and sleep. Measuring actual light exposure was essential for understanding treatment effects.

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0038

INFERRING THE GENETIC BASIS OF SLEEP STATES IN DROSOPHILA WITH HIDDEN MARKOV MODELS (HMMS)Arijit Ghosh¹, Susan Harbison²¹National Heart, Lung, and Blood Institute, ²National Institutes of Health

Introduction: Sleep is essential, yet its genetic regulation is not fully understood. *Drosophila melanogaster* is as a valuable model for sleep research due to conserved genetic similarities with humans. Although traditionally viewed as having a single sleep state, recent evidence suggests flies experience multiple sleep states of varying depths, like mammals. Here, we classify fly sleep states from locomotor activity data and map the time spent in each state to the genome.

Methods: We used HMMs on activity data from 10,130 *Drosophila* flies across 168 genotypes. Models with 2 to 10 sleep/wake states were tested and the best one was selected using statistical and information theory criteria. We iterated the HMM multiple times to assess the accuracy of the model. We also used arousal threshold testing to confirm model accuracy. We performed Genome Wide Association (GWA) with 2,189,692 polymorphisms to find candidate genes associated to each sleep/wake state.

Results: A 4-state HMM with 1000 iterations achieved over 99% accuracy in classifying sleep/wake states. We defined the states as State0 (active wake), State1 (quiescent rest), State2 (light sleep), and State3 (deep sleep) based on activity level. Flies spent an average of 100.34 min in State0, 126.49 min in State1, 147.96 min in State2, and 1065.45 min in State3 per day. Deep sleep had the highest arousal threshold (0.52g), followed by light sleep (0.35g), quiescent rest (0.31g), and active wake (0.26g). Genetic analysis showed significant heritability (0.27-0.50) affecting sleep states. GWA identified 989 SNPs in 505 candidate genes, 376 of which have human orthologs. Network analyses suggested potential hub genes in sleep state regulation, including transcription factors, enzymes, neurotransmitters, extracellular matrix proteins, and neuronal remodeling proteins.

Conclusion: Our study shows that *Drosophila* has distinct, heritable lighter and deeper sleep states. We identified genetic variants common and unique to these states, suggesting targets for future research. This framework, available as an open-source R package, offers a powerful tool to explore genetic mechanisms of sleep.

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0039

VARIANT-TO-GENE MAPPING PAIRED WITH CELL-SPECIFIC GENE KNOCKDOWN IMPLICATES NOVEL EFFECTOR GENES ASSOCIATED WITH SLEEP TRAITSAmber Zimmerman¹, Samaneh Biglari², Kyla Mace¹, Khanh Trang¹, Erika Almeraya Del Valle¹, Matthew Pahl¹, Alessandra Chesi¹, Allan Pack¹, Struan Grant¹, Matthew Kayser¹, Alex Keene²¹University of Pennsylvania, ²Texas A&M University

Introduction: Large-scale Genome Wide Association Studies (GWAS) have been performed for a variety of sleep traits including

insomnia, excessive daytime sleepiness, sleep duration, and chronotype. These studies have provided a wealth of data identifying common genetic variants associated with sleep function and informing biological mechanisms underlying each trait. A primary impediment to interpreting the biological relevance of GWAS loci is that the majority of these variants reside in non-protein-coding regions of the genome often distal to any protein-coding gene. Our work outlines an integrative approach to pinpoint causal genes associated with each GWAS locus using human spatial and functional genomics data paired with cross-species sleep phenotyping.

Methods: We collected lead and correlated ($r^2 > 0.6$) proxy variants from published GWAS summary statistics for insomnia and excessive daytime sleepiness. Cis-regulatory regions were defined using ATACseq and Promoter Capture C/Hi-C data collected from 9 different human-derived brain cell types including neural progenitors, neurons, and glia. GWAS variants were intersected with cell-specific cis-regulatory regions to identify putative causal effector genes contacted by each variant. These implicated effector genes were then screened for their effects on sleep using cell-specific GAL4-RNAi (glial or neuronal subtypes) knockdown in *Drosophila*. Genes showing significant effects on sleep were then validated in a vertebrate model, zebrafish, using CRISPR-mediated knockout paired with sleep phenotyping.

Results: We identified multiple highly conserved regulators of sleep that mapped to both the nearest gene of the GWAS association (e.g. MEIS1 and CADM2) as well as distal genes that were not previously implicated by these GWAS (e.g. PIGQ and AP3B2). Each of these significantly influenced sleep in both *Drosophila* and zebrafish in the same direction and showed cell-specific effects when knocked down in *Drosophila*. Loss of orthologs to MEIS1, which was identified from the insomnia GWAS, showed short and fragmented sleep. Additionally, loss of orthologs to CADM2 and AP3B2, which were identified from the excessive daytime sleepiness GWAS, displayed increased sleep.

Conclusion: Together our integrative cross-species approach defined highly conserved regulators of sleep from human GWAS associations revealing novel biological targets for intervention.

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0040

ASSOCIATIONS OF WAIST CIRCUMFERENCE TO DNA DAMAGE IN NIGHT SHIFT WORKERSMadison Blanco¹, Kirsie R. Lundholm², Hannah M. Bauermeister¹, Nathaniel Tolton¹, Emma Tobin³, Shobhan Gaddameedhi³, Briann Satterfield⁴¹Washington State University Elson S. Floyd College of Medicine,²Washington State University Sleep and Performance Research Center and Department of Translational Medicine andPhysiology, ³North Carolina State University, ⁴Washington State University

Introduction: The association between body composition and chronic diseases, including certain cancers, is well established. Abdominal adiposity, measured clinically as waist-to-hip ratio, has a strong predictive value for disease development independent of body mass index (BMI). Circadian disturbance exacerbates adiposity-related risk of disease, disproportionately affecting night-shift workers. Though it is understood that circadian disturbance can lead to increased genotoxicity—and subsequent

cancer risk—the influence of body composition is poorly understood. Here, we evaluate associations between waist-to-hip ratio, BMI, and shift-work status to DNA damage in immune cells.

Methods: Non-rotating workers, 15 day-shift (DS) and 15 night-shift (NS) (aged 30-55; 16 females), participated in a controlled, 24-hour laboratory study immediately following their typical workweek. Waist-to-hip ratio and BMI were recorded prior to the study. The laboratory environment involved continuous behavioral monitoring and sustained wakefulness. Peripheral blood mononuclear cells (PBMCs) were collected every 6 hours via intravenous catheter. An alkaline comet assay (CometChip, Cell Array) was used to quantify DNA damage in 1153–4738 PBMCs per participant using comet scoring software (CometScore, Trevigan), providing the percent tail DNA (i.e. total percentage of damaged DNA compared to undamaged DNA).

Results: T-tests revealed no significant difference between DS and NS workers' waist-to-hip ratio ($t(23)=-0.18$, $p=0.86$) or BMI ($t(28)=-1.06$, $p=0.30$). Pearson's correlations showed that waist-to-hip ratio was strongly associated with DNA damage in NS workers ($r=0.79$, $p<0.001$), but BMI was not ($r=0.42$, $p=0.12$). In DS workers, there was no significant correlation between DNA damage and waist-to-hip ratio ($r=0.45$, $p=0.19$) or BMI ($r=-0.15$, $p=0.58$).

Conclusion: Our findings are consistent with data showing a relationship between increased waist-to-hip ratio and DNA damage/reduced repair mechanisms in PBMCs, which increases genomic instability and is a hallmark of cancer. However, this was only the case for long-term NS workers, further implicating central adiposity as a risk factor for developing certain cancers in individuals exposed to circadian disturbance. Future research should determine other factors associated with DNA damage in this population.

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0041

FRUCTOSE CONSUMPTION IS RELATED TO DNA DAMAGE IN NIGHT SHIFT WORKERS

Hannah M. Bauermeister¹, Kirsie R. Lundholm², Madison Blanco¹, Nathaniel Tolton¹, Emma Tobin³, Shobhan Gaddameedhi³, Briann Satterfield⁴

¹Washington State University Elson S. Floyd College of Medicine,

²Washington State University Sleep and Performance Research Center and Department of Translational Medicine and Physiology, ³North Carolina State University, ⁴Washington State University

Introduction: Evidence suggests that high-sugar diets are linked to increased genomic instability. Further, circadian disturbance can also lead to increased genotoxicity—and subsequent cancer risk—but the influence of a high sugar diet on this observation is poorly understood. By understanding the association between high-sugar diets, genotoxicity, and circadian disturbance, we hope to identify dietary predictors of increased cancer risk. Here, we evaluate the association between shift work status, the consumption of sugars, and DNA damage in immune cells.

Methods: 30 shift workers (15 night shift (NS); 15 day shift (DS); aged 30-55; 16 females) completed a combined field/laboratory study including 24-hours of continuous wakefulness, hourly isocaloric snacks, and blood draws every 6 hours from which peripheral mononuclear blood cells (PBMCs) were isolated. An alkaline comet assay (CometChip, Cell Array) was used to quantify DNA damage in 1153–4738 PBMCs using scoring software (CometScore, Trevigan), providing total percentage of damaged DNA compared to undamaged DNA. Prior to entering the laboratory, participants completed the General Food Frequency Questionnaire (FHQ) as a metric of past-month food consumption. Total sugar, fructose, carbohydrates, and starch consumption were extracted from the FHQs.

Results: T-tests revealed no significant differences between DS and NS workers for DNA damage ($t(27)=-0.59$, $p=0.56$) or the consumption of carbohydrates, total sugar, glucose, or fructose ($t(27)<1.36$, $p>0.18$). In NS, Pearson correlations revealed a significant, moderate positive relationship between DNA damage and fructose ($r=0.55$, $p=0.04$), and non-significant relationships between DNA damage and other food metrics ($r<0.52$, $p>0.06$). For DS, no significant relationships between DNA damage and each food metric were found ($r<0.49$, $p>0.06$).

Conclusion: We sought to understand how diet contributes to DNA damage in PBMCs and identify how dietary factors are related to genomic instability in shift workers. Our findings align with existing literature, showing a relationship between high intake of fructose and DNA damage. However, this was only the case for night workers, suggesting a potential mechanistic link between diet and cancer risk in this population. Further research is needed to evaluate the utility of these dietary factors as predictors for DNA damage in shift work populations.

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0042

GENE-BY-SLEEP DURATION INTERACTION FOR GLYCEMIC TRAITS IN OVER 480,000 INDIVIDUALS

Heming Wang¹, Pavithra Nagarajan¹, Clint Miller², Amy Bentley³, Raymond Noordam⁴, Kenneth Westerman⁵, Alisa Manning⁵, Han Chen⁶, Lisa de las Fuentes⁷, Susan Redline¹, James Meigs⁵

¹Brigham and Women's Hospital, ²University of Virginia,

³National Institutes of Health, ⁴Leiden University Medical Center,

⁵Massachusetts General Hospital, ⁶University of Texas Health Science Center, ⁷Washington University in St. Louis

Introduction: Both short and long sleep duration have been associated with poor glycemic control and an increased risk of developing type 2 diabetes mellitus. Although sleep duration extremes may differentially modify the effects of genetic risk factors for type 2 diabetes, this has not been systematically investigated.

Methods: We conducted genome-wide gene by sleep duration meta-analyses, separately assessing interactions of short and long sleep, for fasting glucose, fasting insulin, and hemoglobin A1c in up to 489³, 09 individuals without diabetes from seven different population groups. Both 2 degree of freedom (df) joint

tests of main and interaction effects, and 1df interaction tests were employed.

Results: In total, 16 loci were identified to interact with sleep duration — six with short sleep and ten with long sleep. Of these, four loci were identified through cross-population meta-analysis, twelve were specific to a population group, and eleven showed significant sex-dependent effects. Eleven loci (VRK2, PCDH7, TFAP2A, CAP2, PAPP, ZCCHC2, MYH9, SGIP1, JAKMIP3, RRAS2, MAPT) have not been reported in previous glycemic trait genome-wide association studies. Interaction loci identify divergent biological mechanisms for short and long sleep duration influencing glycemic control, such as copper regulation for long sleep and diacylglycerol pathways for short sleep. The identified gene targets suggest potential therapeutic approaches for type 2 diabetes, including strategies involving JIP1–JNK interaction disruption, pericyte health, NMDA receptor activity, anti-inflammatory and leptin-enhancing dietary supplements, and serpins.

Conclusion: These findings suggest that short and long sleep duration influence glycemic regulation through distinct biological pathways, providing novel insights for precision approaches to diabetes prevention and management.

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0043

IMMUNITY TO INFLUENZA B AND CROSS-REACTIVITY TO PANDEMRIX/PH1N1 IN NARCOLEPSY

Guo Luo¹, Jing Zhang¹, Emmanuel Mignot²

¹Stanford University, ²Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: Narcolepsy type 1 (NT1) is caused by 85-95% hypocretin (HCRT) neuron loss due to a combination of genetic and environmental risk factors and associated with DQA1*01:02/DQB1*06:02 (DQ0602, 98%) and T cell receptor (TCR) gene AJ24/AJ28/BV4-2. Pandemic influenza A H1N1 (pH1N1) and Pandemrix vaccination in 2009-2010 induced NT1 onset. Antigen specific T cell immune response in NT1 supports adaptive (auto)immunity against HCRT and Pandemrix/pH1N1. Despite this progress, the mechanism behind HCRT neuron loss and how the flu triggers a response against HCRT are unclear.

Methods: Anti-hemagglutination (HA) antibody was first measured using HA inhibition assay. Binding affinity of B/Victoria candidate peptides to DQ0602 was next tested using a competition binding assay. Antigen-DQ0602 restricted/reactive T cells were further isolated using tetramer DQ0602 and single-cell RNA sequenced with 10X. Lastly, TCR clones were transfected into Jurkat 76 for TCR activation by a certain peptide presented by DQ0602.

Results: Two independent studies of our laboratory and a Chinese group have shown a higher HAI titer against B/Brisbane/60/2008 in NT1. With thorough analysis of their sequences, we found a B/Victoria PB1 epitope that is homologous to Pandemrix/pH1N1 PB1 segment with only one amino acid difference. Using tetramer DQ0602, we detected reactive CD4+ T cells to this epitope in two cohort studies using different subjects. PB1 cells from the

first cohort were sorted out for single-cell RNA sequencing and over 6,000 cells were recovered. Over 90% were effector memory T cells, over 86% were from multiple NT1 patients, and more than 35 clones were enriched at least 20 times, including 2 with over 500 times. These clones were activated by both peptides from B/Victoria and Pandemrix/pH1N1 under NFAT and NF- κ B pathways but not AP-1, suggesting molecular mimicry between influenza A and B through PB1 epitope. In addition, we found TCR clones from baseline PBMCs were activated by Pandemrix/pH1N1.

Conclusion: Our research showed influenza B plays a role in NT1 pathogenesis and cross-reactivity to PB1 between B/Victoria and Pandemrix/pH1N1.

Support (if any): Wake Up Narcolepsy

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0044

PLEIOTROPIC EFFECTS OF APOA2 VARIANTS ON A SLEEP-BASED ADULT EPIDEMIOLOGICAL COHORT IMPLICATED IN SLEEP BREATHING AND MEMORY PHENOTYPES

Mariana Moyses-Oliveira¹, Kingman Strohl², Malú Zamariolli¹, Monica Andersen³, Sergio Tufik⁴

¹Sleep Institute, Associação Fundo de Incentivo à Pesquisa,

²University Hospitals / Case Western Reserve University,

³Departamento de Psicobiologia, Universidade Federal de São Paulo, ⁴Universidade Federal de São Paulo

Introduction: APOA2 gene encodes a subclass of apolipoproteins implicated in the regulation of risk factors for cardiovascular disease and obesity. Functional studies in animal models have demonstrated that APOA2 genetic variants are involved in breathing instability and therefore might confer risk for sleep apnea.

Methods: Phenome Wide Association study (PheWAS) approach was applied in São Paulo Epidemiologic Sleep Study (EPISONO), an adult epidemiological sample (1,042 individuals, 20-80 years-old) to address effects of APOA2 SNV rs5082. EPISONO sample was subjected to SNP-array genotyping and deep phenotyping, including objective and subjective sleep evaluations, laboratory tests, clinical scales, anthropomorphic measurements and sociodemographic inquiries. An additive genetic model contrasted rs5082 genotypes with 460 traits. Different regression models were applied depended on the nature of the phenotypic variable. Covariates included age, sex, principal components (PCs 1-10), and the Brazilian socioeconomic classification questionnaire. In a second round, body mass index (BMI) was included as an additional covariate. To correct for multiple testing, Bonferroni test was applied and non-parametric tests were used to validate nominally significant associations.

Results: Fifteen suggestive associations ($p < 0.05$ in PheWAS) were validated by non-parametric tests. In the biochemistry profile, high-density lipoprotein, and eosinophils/eosinophils count were linked to allelic differences. Of polysomnography measures, respiratory effort-related arousals (RERAs) were linked. Prospective memory total score and memory complaints evaluated by the Prospective and Retrospective Memory Questionnaire were also implicated. The score for risky tobacco use measured by Alcohol,

Smoking and Substance Involvement Screening Test was associated with genotype. When adjusting for BMI, an inquiry about overall satisfaction about health conditions remained significant after Bonferroni correction.

Conclusion: Known APOA2 SNP associations with lipid metabolism (HDL dosage) were replicated in an admixed cohort, despite sample size limitations. A lack of a direct effect on obesity may be explained by dietary heterogeneity (information not collected). Suggestive associations are present concerning variant effect on expression of RERAs, consistent with the deterministic effect of APOA2 expression observed mouse models. Memory associations imply that APOA2 may affect cortical function, consistent with its apolipoprotein role in cholesterol transport.

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0045

DIURNAL BIOMARKER DYNAMICS AFTER SLEEP LOSS ACROSS PLASMA, TEV, AND NEV COMPARTMENTS IN ADULTS WITH AND WITHOUT MTBI

Lillian Skeiky¹, Michael Smith¹, Vera Matrosova¹, J. Kent Werner²

¹Uniformed Services University, ²Uniformed Services University of Health & Sciences

Introduction: Traumatic brain injury (TBI) has been linked to alterations in neuroinflammatory signaling, synaptic function, glymphatic, and circadian regulatory pathways. Because sleep supports metabolic and glymphatic clearance, sleep loss may amplify neuronal and inflammatory stress signals. Diurnal biomarker patterns across plasma and extracellular vesicle (EV) compartments remain poorly defined. This study examined evening (post-sleep loss, PSL) and morning (post-recovery sleep, PRS) biomarker profiles, with exploratory evaluation of whether mild TBI (mTBI) history modulates these dynamics.

Methods: Twenty-five adults (mean age 40.3 ± 8.3 years; 9 with mTBI) completed an unsupervised at-home sleep-loss protocol. Blood collected after PSL (PM) and PRS (AM) was analyzed for TNF- α , IL-17, amyloid- β 42, and α -synuclein in plasma and EV fractions using MSD platforms. EV subtype analyses quantified total EVs (TEVs), neuron-enriched EVs (NEVs), and NEV:TEV ratios. Diurnal changes, cross-compartment correlations, and exploratory TBI group differences were evaluated using ANOVA, paired comparisons, and regression models.

Results: TNF- α and A β 42 were significantly higher in PM than AM, consistent with increased inflammatory drive or reduced evening clearance after sleep disruption. IL-17 and α -synuclein showed clear PM/AM reductions, with α -synuclein demonstrating the largest shift, suggesting partial overnight normalization potentially linked to restored clearance. Plasma-EV correlations were positive across analytes; TNF- α and A β 42 maintained strong cross-compartment alignment, whereas IL-17 and α -synuclein correlations weakened in the morning. Individuals with mTBI exhibited moderately higher concentrations and larger diurnal changes, but overall temporal patterns were similar across groups. TEVs were dramatically more abundant than NEVs across all conditions, and NEVs represented a small, stable proportion of

total EVs (~3–4%) with slight PM elevations. Neither TEV nor NEV concentrations showed meaningful diurnal or TBI-related differences.

Conclusion: Sleep loss disrupts diurnal inflammatory and neuronal biomarker rhythms, potentially reflecting altered clearance processes, while EV subtype proportions remain stable. Combined plasma and EV profiling offers a scalable framework for identifying physiological stress signatures across both mTBI and non-mTBI populations.

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0046

EARLY-LIFE STRESS IS ASSOCIATED WITH A BIOMARKER OF MITOCHONDRIAL FUNCTIONING IN NIGHT SHIFT WORKERS

Nathaniel Tolton¹, Kirsie R. Lundholm², Gillian Szabo³, Naveena Sivakumar³, Madison Blanco¹, Hannah M. Bauermeister¹, Shobhan Gaddameedhi³, Brieann Satterfield¹

¹Washington State University Elson S. Floyd College of Medicine,

²Washington State University Sleep and Performance Research Center and Department of Translational Medicine and

Physiology, ³North Carolina State University

Introduction: Chronic stress from sleep deprivation, circadian disruption, and occupational demands among shift workers may increase cumulative wear-and-tear on the body, known as allostatic load (AL). Additionally, individuals with a high prevalence of Adverse Childhood Experiences (ACEs) exhibit heightened vulnerability to disease, and this risk may be particularly pronounced among shift workers with elevated ACE exposure. Mitochondrial DNA (mtDNA) is highly susceptible to reactive oxygen species-induced damage and therefore has been described as a marker for poor health. Here, we investigate the relationship between stressful early-life events and immune cell mtDNA in shift workers.

Methods: 12 day-shift (DS) (aged 30-55; 5 females) and 12 night-shift (NS) workers (aged 27-52; 9 females) participated in this combined field/laboratory study. Participants completed their regular shift cycle, slept at home, and then reported to the laboratory as if beginning another shift. Participants completed a strictly controlled 24-hour constant routine with continuous wake, and blood collections via intravenous catheter every 6 hours. Real-time PCR was performed on sheared, genomic DNA extracted from peripheral blood mononuclear cells from each sample ($n=4$ /participant) using primers targeting the mtDNA gene hMito3 (127bp amplicon size). Results were normalized to the nuclear DNA (nDNA) gene B2M1 (188bp amplicon size). The mtDNA to nDNA ratio reflects the mtDNA copy number (mtDNAcn), allowing for comparison of mtDNA across individuals. The ACE questionnaire was administered during a pre-study screening session.

Results: T-tests revealed no significant differences of mtDNAcn ($t(22)=-0.39$, $p=0.70$ or ACE scores ($t(22)=-0.41$, $p=0.69$) between NS and DS workers. Pearson's correlation was used to compare the averaged mtDNAcn to the ACE scores of the NS and DS workers.

ACE scores were positively correlated with mtDNAcn ($r=0.66$, $p=0.02$) in NS, but not DS workers ($r=0.08$, $p=0.79$).

Conclusion: This combined field/laboratory study revealed significant associations between mtDNAcn and exposure to ACEs. These findings suggest that mtDNA alterations may represent a cellular pathway through which early-life stressors manifest physiologically. This mechanistic link provides a foundation for future research exploring how stress contributes to an accelerated AL, particularly among night shift workers.

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0047

ENRICHMENT OF THE LSAMP VARIANTS IN DSWPD PATIENTS: LARGE WHOLE GENOME SEQUENCING ANALYSIS FROM A CLINICAL STUDY

Sandra Smieszek

Vanda Pharmaceuticals

Introduction: We are conducting a clinical study in Delayed Sleep-Wake phase disorder (DSWPD) patients. The objective of this work was to measure sleep-wake patterns and to conduct exploratory genetic analyses to delineate the genetic landscape of the DSWPD phenotype.

Methods: We measured the sleep-wake patterns (self-reported bedtime, wake time, midpoint of sleep, and sleep latency) of participants by daily post-sleep diaries for 4 week screening period. Participants completed questionnaires pertaining to demographics, medical and surgical history, sleep history, and concomitant medications. Altogether, 170 participants were consented and provided samples for whole genome sequencing.

Results: We observed a significant enrichment of LSAMP. We observed significantly higher frequencies in cases as compared to controls. Controls were defined as participants screened for not having sleep issues/nor diagnosed sleep disorders. MAF in the DSWPD cases was 0.20 versus 0.11 MAF in matched super controls. Allelic frequency varied across ancestries. We have analyzed adjusting for population stratification. LSAMP variants are of particular interest as it is implicated in mood, anxiety, and tumor suppression, acting on limbic system functions like emotion and behavior, potentially by affecting cell proliferation pathways, with research suggesting its role in disorders like depression and epilepsy and seen across numerous neuropsychiatric disorders.

Conclusion: These results demonstrate that, on average, DSWPD individuals are more likely to harbor variants within LSAMP, potentially leading to risk for development of a pronounced delay in sleep period. This variant can further impact the response to treatments.

Support (if any):

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0048

GENETIC PLEIOTROPY HIGHLIGHTS SHARED NEUROIMMUNE MECHANISMS BETWEEN INSOMNIA AND INFLAMMATION

Farah Abou Daya, Richa Saxena

MGH, Harvard Medical School, Broad Institute

Introduction: Insomnia is a prevalent sleep disorder associated with elevated systemic inflammation. Circulating levels of IL-1 β , IL-6, CRP, TNF α , and TGF β are increased in individuals with poor sleep, yet the genetic and causal relationships underlying these associations remain unclear. Understanding whether insomnia drives inflammation or vice versa is critical for elucidating mechanisms linking sleep disruption to immune dysregulation and neuroimmune processes. Here, we aimed to identify and characterize shared genetic mechanisms between insomnia and multiple inflammatory markers.

Methods: We analyzed GWAS summary statistics for insomnia (UK Biobank and 23andMe; ~593,000 cases, ~1.7 million controls) and inflammatory markers (UK Biobank). CRP GWAS data included ~436,345 individuals; GWAS for IL-6, IL-1 β , TNF α , and TGF β included ~50,000 individuals each. We estimated genome-wide genetic correlations using LDSC. We then identified pleiotropic genetic loci using PLACO and performed functional annotation, as well as pathway and tissue expression enrichment analyses through FUMA. To detect shared causal variants, we conducted colocalization analyses using SuSiE coloc. Finally, we applied bidirectional Mendelian randomization to assess the direction of causality between insomnia and each inflammatory marker.

Results: We observed significant positive genetic correlations between insomnia and all inflammatory markers ($r_g = 0.11-0.22$, Bonferroni-corrected $p < 0.01$). We identified 125 pleiotropic loci for CRP and 3-8 loci per other cytokine, which were enriched in key brain regions (e.g. hypothalamus, amygdala). Pathway analyses revealed cytokine-specific mechanisms shared with insomnia: CRP loci mapped to chromatin organization and cellular senescence; IL-6 and TNF α loci were enriched for interferon- γ signaling; and TGF β loci highlighted integrin signaling, MAPK linkage, and vascular smooth muscle contraction. Colocalization analyses identified shared causal variants, including rs429358 (APOE E4) for CRP, linking insomnia with neuroinflammatory pathways. Bidirectional MR analysis found that insomnia causally increased CRP, IL-6, and TGF β ($p < 0.001$); however, no significant causal effects of any cytokine on insomnia were observed.

Conclusion: These results reveal shared genetic mechanisms and neuroimmune pathways involving APOE and cytokine-specific signaling that link insomnia directly to multiple cytokines and suggest that insomnia drives systemic inflammation. Our findings provide a comprehensive framework for understanding how disrupted sleep promotes immune dysregulation and increases risk for neuroinflammatory conditions and related comorbidities.

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0049

SINGLE BASE PAIR CHANGE IN FRIZZLED AFFECTS SLEEP STATE IN DROSOPHILA

Rachel Lyman, Terry Tansey, Arijit Ghosh, Yazmin Serrano Negron, Susan Harbison

National Institutes of Health

Introduction: Candidate polymorphisms for night sleep duration were previously identified based on differences between selectively bred long-sleeping and short-sleeping flies. A polymorphism found in an intron of the frizzled gene had a “G” allele associated to long sleep, and a “T” allele associated to short sleep. We sought to verify the effect of this polymorphism on sleep.

Methods: We used a long-sleeping line from the Sleep Inbred Panel (SIP), a group of 39 long- and short-sleeping lines, as our defined genetic background. We replaced the existing long-sleeping “G” allele with the short-sleeping “T” allele using CRISPR/-Cas9 homology directed repair. This process created homozygous frizzled modified lines as well as sibling lines derived from three

independent transformants. Sleep was measured using Trikinetics *Drosophila* Activity Monitors.

Results: Small but significant decreases in night sleep duration occurred in two of the three transformant lines with the “T” allele, losing 7.2 ($P = 0.0349$) and 7.9 ($P = 0.0116$) minutes of sleep, respectively. Applying a Hidden Markov Model demonstrated a significant difference in the time spent in different putative sleep states between frizzled modified and sibling lines. Flies with the long-sleeping “G” allele spent more time in putative deeper sleep states, while flies with the short-sleeping “T” allele spent more time in putative lighter sleep states.

Conclusion: These differences demonstrate that sleep in *Drosophila* is affected by a single base pair change in frizzled, as well as affecting specific sleep states. We are conducting bulk RNA sequencing on the brains of frizzled modified and sibling flies to determine whether changes in gene expression produced the change in sleep.

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0050

THE NEMURI ANTIMICROBIAL PEPTIDE PROMOTES LIPID REMODELING DURING SICKNESS SLEEPJulie Williams, Molly Clark, Pinky Kain, Arjun Sengupta, Ewa Strus, Aalim Weljie, Niringini Naidoo
University of Pennsylvania

Introduction: Sleep deprivation, aseptic injury, and infection activate the innate immune response and promote recovery sleep, or "sickness" sleep. In *Drosophila*, two NF κ B genes, Dif and Relish, are required for promoting sleep following sleep deprivation and infection, respectively. *nemuri*, a sleep promoting antimicrobial peptide, is also induced by sleep deprivation and infection, and dependent on Dif and Relish, respectively, for its induction. NF κ Bs contribute to synthesis of membrane phospholipids through an IRE1/xbp1-dependent mechanism, possibly due to lipid bilayer stress caused by massive induction of antimicrobial peptides. We have observed that upregulation of *nemuri* in the brain severely reduces lipid droplets throughout the fly. Using lipidomics we tested whether upregulation of *nemuri* disrupts lipid homeostasis and thereby promotes sickness sleep.

Methods: Female flies over expressing *nemuri* (*elavC155-Gal4>UAS-nemuri*) and parental controls (*elavC155-Gal4/+* and *+UAS-nemuri*) were collected at ZT 2 and 14. Flies from different time points were pooled to eliminate circadian effects. Lipids isolated from heads were subjected to lipid profiling (*n*=4 samples per group) using Desi-Mass spectrometry. Positive and negative mode lipidomics data were subjected to multivariate orthogonal partial least squares-discriminant analysis (OPLSDA). Multivariate analysis was used to guide the classification of samples. Individual lipids were compared using non-parametric tests.

Results: Untargeted high resolution mass spectrometric lipid profiling of these flies indicated significant increases in lipids detected in both positive and negative modes with glycerophospholipids and sphingolipids comprising over 60% of those affected. Other lipid types that were increased included acylcarnitines, fatty acids, and glycerolipids. Cardiolipins in particular were uniquely increased by upregulation of *nemuri*, suggesting a disruption of mitochondrial function. Reducing lipid bilayer stress reduced excessive sleep in *nemuri* over-expressing flies.

Conclusion: These findings indicate an effect of *nemuri* on lipid remodeling in plasma membranes. Addressing disruption of lipid homeostatic factors could resolve excess sleepiness or fatigue that occurs with chronic illness.

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0051

DIRECT STIMULATION TO THE THALAMUS EVOKES SLEEP SPINDLES IN HUMANSRina Zemann, Devang Sehgal, Krishma Shenoy, Peter Hadar, Angelique Paulk, Elizabeth Klerman, Sydney Cash
Massachusetts General Hospital

Introduction: The thalamus plays a key role in supporting sleep and can be a target of therapeutic stimulation. We investigated

whether electrical stimulation delivered to the thalamus in humans can evoke sleep spindles and the effect of stimulation delivered to different subnuclei.

Methods: Participants (*N*=5) were patients with refractory epilepsy and semi-chronic clinically implanted depth electrodes, including at least one in the thalamus, as part of their epilepsy pre-surgical evaluation. Single pulse electrical stimulation (SPES; Bipolar 233microseconds, 7mA) was delivered to the thalamus (2-4 sites) with simultaneous intracranial EEG recordings (100-200 channels) during N2 sleep (assessed from simultaneous scalp EEG). Individual contacts were identified and localized from combined post-operative CT and pre-operative MRI. Anatomical labelling included anterior (ANT), centromedial (CM), and pulvinar (PUL) thalamic subnuclei.

Results: Stimulation to the thalamus generated responses across the brain during wake and sleep. Stimulation delivered to each subthalamic nuclei had specific response connectivity, with ANT primarily connected to frontal regions, CM to central and other subcortical regions, and PUL to temporal and parietal regions. This connectivity distribution was similar during wake and sleep, although during sleep, the number of channels with a response to stimulation was reduced by 46%. Thalamic SPES evoked K-complexes followed by spindles in all patients and from all thalamic subnuclei. Both K-complexes and spindles were time and phase-locked to the stimulation. Stimulation delivered to the ANT evoked the highest percentage of spindles with the longest duration, especially in frontal regions. Interestingly, spindles alone (without K-complex) were also evoked in frontal regions (*N*=2). Evoked oscillations were consistent across individual trials, producing spindles in up to 95% of the trials. Mean central frequency of evoked spindles was 12Hz and mean duration was 600ms. Spectral power in the spindle band (10-16Hz) was higher following stimulation (0.025-1.5s) than in the pre-stimulation baseline (*p*<< 0.001).

Conclusion: Direct stimulation to the thalamus evokes individual spindles in humans. Different subnuclei may have differential effect on sleep oscillations. Understanding where in the brain and with which stimulation spindles could be evoked could improve our mechanistic understanding of spindle generation and may have implications for sleep integrity and memory consolidation.

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0052

ZOLPIDEM AND INFRASLOW OSCILLATIONS IN HUMAN SLEEP: A RETROSPECTIVE MATCHED CASE-CONTROL STUDYJulia Ma¹, Shaun Purcell², Can Zhang³, Janet Mullington⁴, Robert Thomas⁴, Haoqi Sun⁴¹University of Massachusetts, Amherst, ²Brigham and Women's Hospital, ³Massachusetts General Hospital, ⁴Beth Israel Deaconess Medical Center

Introduction: Although zolpidem is a widely prescribed non-benzodiazepine hypnotic that acts through GABA-A receptors. Emerging evidence shows that zolpidem dampens noradrenergic infraslow oscillations (ISO) and vascular vasomotion during non-rapid eye movement (NREM) sleep, thereby reducing glymphatic clearance in mice. Whether analogous changes in sleep microstructure occur in humans taking zolpidem is unknown.

Methods: We analyzed data from 8,180 adults who underwent overnight polysomnography (PSG) at the Massachusetts General

Hospital site in the Human Sleep Project. 105 (1.3%) participants had zolpidem, defined as prescription(s) within 15 days before PSG. Electroencephalography (EEG) was used to quantify the ISO during NREM using Luna software. We first generated timeseries of band powers for different frequency bands, and then the 0.005-0.03Hz relative band power of ISO (%) was computed from these timeseries. We used optimal propensity-score matching to compare zolpidem users with non-users and conducted stratified analyses by sex and apnea-hypopnea index (AHI).

Results: Compared with matched non-users, individuals with zolpidem prescriptions within 15 days before PSG had a slightly lower occipital beta-band ISO power (-1.1%, $p=0.011$). In males, zolpidem was associated with higher delta-band ISO power (1.2%, $p=0.045$) and lower beta-band ISO power (-1.4%, $p=0.023$) in central regions, while females had higher theta-band ISO powers across all regions (1.2-1.4%, $p<0.05$). In people without apnea ($AHI<5$), zolpidem was associated with lower frontal and central alpha-band ISO power (-1.1 to -1.6%, $p<0.01$). Meanwhile, in participants with at least moderate apnea ($AHI>15$), zolpidem was associated with a higher occipital delta-band ISO power (1.8%, $p<0.001$) and 1/f-corrected slow sigma-band ISO power (1.5%, $p<0.001$).

Conclusion: Zolpidem was associated with reduced fast-band (alpha and beta) ISO and elevated slow-band (delta and theta) ISO, but was not associated with the spindle/sigma-band ISO that has been described in mice. In severe sleep apnea, zolpidem is associated with beneficial ISO changes, including delta-band and spindle/sigma-band ISO powers. The limitations include unknown actual zolpidem use on the night of PSG, lack of external validation, and use of a clinical population.

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0053

COMPARATIVE EFFECTS OF COMMON ANESTHETIC-SEDATIVES ON GLYMPHATIC FUNCTION AND CLEARANCE

Abdulrahman Alganitry, Hari Koli, Jenna Leclerc
University of Virginia

Introduction: The glymphatic system is a brain-wide clearance pathway responsible for removing metabolic waste products and toxins, functioning primarily during sleep. Among anesthetic agents, dexmedetomidine uniquely promotes slow-wave sleep states, making it particularly relevant for studying sleep-dependent glymphatic clearance. As a commonly used sedative in operating rooms and intensive care units, understanding dexmedetomidine's and other anesthetic-sedatives' specific effects have direct clinical implications. However, nearly all studies have examined dexmedetomidine combined with isoflurane or ketamine, making it unclear which agent is responsible for observed glymphatic effects. Determining independent contributions is critical for optimizing anesthetic selection in clinical practice. To address this gap, we designed a study that separates the individual effects of dexmedetomidine and ketamine on glymphatic function.

Methods: Male C57BL/6 mice (8-12 weeks, $n=4-8$ per group) underwent cisterna magna cannulation for intracisternal gadolinium injection during 9.4T MRI under 2 doses of dexmedetomidine (0.2/0.5 mg/kg), isoflurane (1-2%), ketamine (150 mg/kg), or ketamine-dexmedetomidine (75/0.3 mg/kg) anesthesia. Dynamic

contrast-enhanced MRI captured tracer distribution over 90 minutes to assess glymphatic function. To quantify parenchymal clearance, separate cohorts received intrastriatal injection of fluorescein-conjugated albumin (74 kDa). Animals then received anesthetic-sedative administration or remained awake (control) before brain harvest at 6, 12, 24 and 48-hour timepoints. Coronal sections (30 μ m) were imaged via fluorescence microscopy, and albumin signal intensity was quantified using MATLAB and imageJ. Statistical comparisons used one-way ANOVA with Tukey's post-hoc test.

Results: Glymphatic function differed significantly between anesthetic groups ($p<0.05$), with dexmedetomidine (dose dependent effect) demonstrating the greatest enhancement. Comprehensive regional analysis revealed significant group differences across CSF entry sites (basilar artery, basal foramina, Circle of Willis, MCA), intraparenchymal penetration zones (1.5 and 3 mm from MCA), and all major cranial clearance pathways: nasal (olfactory bulb, nasal turbinates, pharyngeal lymphatics), basal (basal outflow, cranial nerve ganglion), and dorsal (superior sagittal sinus). Ongoing studies using fluorescein-albumin tracers are investigating longer-term parenchymal clearance dynamics across anesthetic groups and awake controls.

Conclusion: Our study demonstrates that anesthetic choice significantly impacts glymphatic function. Across all major CSF pathways, dexmedetomidine alone produced the greatest enhancement, followed by ketamine-dexmedetomidine combination. Isoflurane and ketamine monotherapy showed the most reduced function.

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0054

EFFECTS OF SIK3 SLEEPY MUTATION ON HYPOTHALAMIC FUNCTION IN MICE

Ronit Witztum, Kerly Lozano, Yunayi Pei, Korey Kam, Andrew Varga
Icahn School of Medicine at Mount Sinai

Introduction: The hypothalamus is a small brain region involved in diverse functions such as the sleep/wake cycle, metabolic control, thermoregulation, and innate behaviors such as aggression and sex. The *Sik3*^{Slp/+} mouse model was identified by a forward-genetics screen for sleep duration. While *Sik3*^{Slp/+} mice exhibit decreased total wake time and increased NREM time with elevated delta wave density during the dark phase, sleep microarchitecture and other aspects of hypothalamic function have not previously been assessed.

Methods: Sleep architecture was recorded and analyzed in *Sik3*^{Slp/+} mice and non-transgenic littermates via 24hr EEG/EMG between 2 and 8 months of age. Weight, glucose and insulin tolerance tests (GTT and ITT) were recorded across the life span. Core body temperature was recorded for 3 weeks using intraperitoneal temperature sensor. Finally, aggressive behavior of male *Sik3*^{Slp/+} and non-transgenic mice was assessed in the light and dark cycle using the resident intruder test (RI).

Results: Sleep architecture analyses revealed that total sleep time (TST) and total NREM sleep time ($p<0.001$) were increased in *Sik3*^{Slp/+} mice as expected, with increased slow oscillation density ($p<0.0001$), but mean NREM bout length was significantly shorter ($p<0.0001$) with increased arousal index ($p<0.001$). Spindle duration ($p=0.001$) and power ($p=0.005$) were also significantly decreased in *Sik3*^{Slp/+} mice. *Sik3*^{Slp/+} mice gain excessive

weight with age, and manifest significantly increased glucose levels during GTT but not ITT. Core body temperature mesor ($p = 0.05$) and amplitude ($p < 0.0001$) were lower in *Sik3Slp/+* compared to non-transgenic mice, and there was a significant inverse relationship between weight and core body temperature in *Sik3Slp/+* mice. Evaluation of aggression levels using RI test in *Sik3Slp/+* and non-transgenic male mice, revealed a trend towards lower total aggression time in *Sik3Slp/+* males in the dark phase.

Conclusion: *Sik3Slp/+* sleep architecture suggests an increased sleep drive coupled with a less stable sleep architecture, which we speculate may stem from altered neuronal calcium dynamics. The lower core body temperature, obesity, and tendency to lower levels of aggression in males, also support the hypothesis of hypothalamic dysfunction of this mouse model.

Support (if any):

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0055

NEUROINFLAMMATORY DAMAGE IN THE PRE-BÖTZINGER COMPLEX CONTRIBUTES TO THE CENTRAL MECHANISM BY WHICH INTERMITTENT HYPOXIA EXACERBATES SLEEP APNEA

Xiaoyu Ma, Yuanyuan Ma, Cheng Zhang, Guangfa Wang
Peking University First Hospital

Introduction: Research indicates that intermittent hypoxia (IH), a key factor in the progression of Obstructive Sleep Apnea (OSA), can exacerbate the condition. However, the underlying central neural mechanisms remain incompletely elucidated. Specifically, it is still unknown whether IH disrupts respiratory control by triggering neuroinflammation within the brainstem respiratory centers.

Methods: SD rats with surgically implanted cranial electrodes underwent sleep-breathing monitoring before and after a 4-week intermittent hypoxia (IH) exposure (10%-21% O₂, 120-second cycle, 8 h/day). The medullary respiratory centers were then collected for analysis. We performed immunofluorescence, immunohistochemistry, and Nissl staining to evaluate neuronal/glial damage, activation, and polarization. Apoptosis was assessed by TUNEL staining. Oxidative stress markers and electron microscopy were used to examine central oxidative stress and neuroinflammation.

Results: Respiratory Phenotype: Intermittent hypoxia (IH) led to an increased spontaneous apnea index in rats. Neuroinflammation: Microglia and astrocytes showed marked activation, demonstrated by hypertrophy, thickened branches, and an increased cell count. Neuronal Injury: Neurons in the preBötzinger complex (preBötC) were damaged, as shown by a decrease in Nissl-positive cells and electron microscopic observations of mitochondrial swelling and vacuolization. Oxidative Stress: This was evidenced by elevated NADPH oxidase activity and ROS levels, suggesting suppressed antioxidant enzyme activity and accumulated oxidative stress products.

Conclusion: The progressive nature of sleep apnea may be driven by intermittent hypoxia, which disrupts respiratory control by

injuring the preBötzinger complex through microglia-mediated neuroinflammation.

Support (if any):

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0056

STATE-DEPENDENT AROUSABILITY TO NOXIOUS STIMULI DURING SLEEP IN NAÏVE AND NERVE-INJURED MICE

Chloe Alexandre¹, Allison Gonzalez², William Hu¹, Victor Duarte Holanda¹, Alban Latremoliere¹

¹Johns Hopkins School of Medicine, ²Johns Hopkins University

Introduction: Up to 75% of chronic pain patients report difficulty maintaining sleep, frequent nocturnal awakenings, and non-restorative sleep. In murine models of neuropathic pain, we similarly observe more brief arousals during NREM sleep than in pain-free controls. Despite the clinical relevance of pain-induced sleep disruption, nociceptive processing during sleep remains poorly understood. Here, we quantified pain-evoked arousability across sleep states (NREM and REM) and sleep conditions: spontaneous sleep, high sleep pressure (recovery sleep after acute sleep deprivation), and fragmented sleep induced by neuropathic pain. This design tested whether (i) increased sleep pressure and specific pre-stimulus EEG features modulate the probability of pain-evoked awakenings, and (ii) a pre-existing pain condition further increases vulnerability to nociceptive awakenings.

Methods: Adult mice expressing channelrhodopsin-2 selectively in Nav1.8+ neurons (C and Aδ fibers) were implanted with EEG/EMG electrodes and habituated to recording conditions. During continuous EEG/EMG monitoring, calibrated optogenetic stimuli were delivered to the plantar hindpaw during NREM or REM sleep under three conditions: spontaneous sleep, recovery sleep (after acute sleep deprivation), and fragmented sleep in a neuropathic pain model. Arousals were scored offline using EEG/EMG and time-locked video/observer logs to classify each stimulus as triggering an "awakening" or a "sleep-through" (maintained sleep). Pre-stimulus EEG power in conventional frequency bands was quantified.

Results: Pain-evoked awakenings were strongly state-dependent, with the highest probability during NREM sleep (~90 %) and the lowest during REM sleep (< 5%). High sleep pressure and deeper NREM sleep moderately increased the likelihood of maintaining sleep through nociceptive simulations. When nociceptive stimuli did not trigger an awakening, the preceding NREM sleep showed higher EEG power in the delta (0.5-4.5 Hz) and sigma (10-15 Hz; spindles) frequency ranges, suggesting that ongoing slow-waves and spindles can modulate the probability of pain-evoked arousability.

Conclusion: Optogenetic activation of peripheral nociceptors reveals that pain-evoked awakenings are gated by both global sleep state and cortical EEG dynamics. Identifying EEG signatures associated with resilience or vulnerability to pain-related awakenings may guide the development of sleep-based biomarkers and interventions to protect sleep in patients with chronic pain conditions.

Support (if any): Blaustein Pain Research Fund (CA)

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0057

APOE4 GENOTYPE AND BLUNTED HOMEOSTATIC SLEEP EEG IN YOUNG ADOLESCENTS: AN EARLY MARKER OF ALZHEIMER'S DISEASE RISK?Jared Saletin¹, Gina Mason¹, Claire Mayew Sherman², Jayne Clark², Bridget Berman², Caroline Gredvig-Ardito², John McGeary¹, Athene Lee¹, Hwamee Oh¹, Mary Carskadon¹¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²E.P. Bradley Hospital Sleep Research Laboratory

Introduction: The e4 allele of the Apolipoprotein (APOE4) contributes to sleep disturbances and increases risk for Alzheimer's Disease (AD). When in life these risks emerge is unknown. Specifically, whether APOE4 status alters sleep in adolescents has not been investigated. We present a study of sleep physiology under rested and homeostatic challenged conditions in healthy adolescents whose genetic risk for AD is heightened by APOE4 carrier status.

Methods: Thirty-seven cognitively healthy youth (9.6-15.8 [12.2±1.5] years; 18M) were genotyped as high (n=11; 9.6-13.1 [11.6±1.3] years; 3M) or low (n=26, 9.6-15.8 [12.4±1.6] years; 15M) risk for AD (APOE4 carrier [≥1 allele] vs. non-carrier [0 alleles]). After 1-week of 9.5h sleep stabilization and a laboratory adaptation night, participants slept in the laboratory for two consecutive nights: baseline (9.5h TIB) followed by wake-extension (4.5h delayed bedtime; 5h TIB). PSG included 9 EEGs (F3,Fz,F4,C3,Cz,C4,P3,P4,O1,O2). After staging (R&K) and artifact-rejection, we computed relative delta (.5-4 Hz) power in NREM (stages 2-4) across the first three sleep cycles. A linear mixed-effects model (covariates: age, sex; random intercepts: subject, EEG-channel) examined gene-risk (high vs. low), sleep condition (baseline vs. wake-extension) and NREM cycle.

Results: We identified expected main-effects of cycle (i.e., delta decayed over time; $F(2,1804.8)=672.1$; $p<.001$) and condition (i.e., delta increased after wake-extension ($F(1,1808.3)=118.6$; $p<.001$). However, we detected a significant interaction of gene-risk, sleep condition, and NREM cycle ($F(2,1804.3)=3.3$, $p=.039$); i.e., the time-course of delta power was moderated by gene-risk. Wake extension for high-risk youth showed a blunted decay of delta between cycles 1 and 2 ($b=.043$; $p<.001$) relative to baseline; this effect was not found for the low-risk group ($b=.01$; $p=.19$) where delta decay did not differ between sleep conditions.

Conclusion: These data indicate that genetic risk of Alzheimer's Disease may affect the homeostatic response of NREM delta power in healthy youth. Whether these differences, when coupled with the routine experience of adolescent insufficient sleep, contribute to lifelong risk (e.g., altered glymphatic clearance or amyloid-beta accumulation) remains unknown. Our findings offer novel evidence of a sleep signature for dementia risk decades before cognitive decline, opening unprecedented opportunities for prevention.

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0058

BRAIN VISCOELASTIC PROPERTIES PREDICT DISTINCT DOMAINS OF SLEEP QUALITYJarno Tuominen¹, Robert Davis², Louisa Wood², Samuel Patz³, Curtis Johnson⁴, Lucy Hiscox²¹University of Turku, ²Cardiff University, ³Harvard Medical School, ⁴University of Delaware

Introduction: Sleep quality arises from neural systems interactions that regulate arousal, emotional processing, and sleep-wake stability. Emerging work suggests mechanical properties of brain tissue—reflecting microstructural integrity and network organization—may shape the efficiency and resilience of these regulatory processes. Magnetic Resonance Elastography (MRE) offers a non-invasive means of quantifying viscoelastic properties, yet its relevance to sleep remains largely unexplored. We hypothesised biomechanical characteristics of sleep-relevant neural systems would correspond to specific domains of sleep quality captured by the Pittsburgh Sleep Quality Index (PSQI).

Methods: We examined 43 healthy older adults (mean age = 59 ± 3 years; 77% female). High-resolution MRE quantified global brain and white matter shear stiffness and damping ratio, as well as regional viscoelastic properties across sleep-related structures, including the medial prefrontal cortex (mPFC), amygdala, hippocampus, putamen, thalamus, caudal and rostral components of the anterior cingulate cortex (ACC), and insula. Subjective sleep characteristics were assessed with the PSQI global score and its component scores. Robust regression models evaluated associations between MRE metrics and PSQI components while adjusting for age, sex, and family history of dementia.

Results: Higher global PSQI scores were associated with lower mPFC stiffness ($\beta = -19$, $p=.038$). Component-level analyses revealed distinct biomechanical signatures. Poorer subjective sleep quality corresponded to increased stiffness in the caudal ACC ($\beta=618$, $p=.022$). Longer sleep latency was linked to widespread increases in stiffness across the whole brain ($\beta = 149$, $p = 0.010$), white matter ($\beta=162$, $p=.004$), amygdala ($\beta=445$, $p=.025$), hippocampus ($\beta=308$, $p=.018$), putamen ($\beta=278$, $p=.015$), insula ($\beta=201$, $p=.041$), and mPFC ($\beta=154$, $p=.028$). Greater reliance on sleep medication was associated with lower rostral ACC stiffness ($\beta=-226$, $p=.007$).

Conclusion: This study is the first to demonstrate that region-specific viscoelastic signatures within the brain map onto distinct dimensions of sleep quality. Increased stiffness in caudal ACC, hippocampus, and related limbic structures may reflect heightened emotional or mnemonic load affecting sleep initiation, whereas reduced rostral ACC stiffness may signal diminished regulatory integrity tied to medication use. Together, results highlight a distributed biomechanical network supporting sleep regulation and demonstrate that MRE-derived tissue properties provide a promising biomarker framework for understanding vulnerability to poor sleep quality and informing targeted interventions.

Support (if any):

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0059

CAUSATIVE ROLE OF HYPERACTIVE LOCUS COERULEUS IN INSOMNIA DISORDER: A REM SLEEP INSTABILITY MODEL USING CLOSED-LOOP OPTOGENETICSChanyoung Cheong, Euisuk yoon, Tae Kim
Gwangju Institute of Science and Technology

Introduction: Insomnia disorder (ID) is characterized by chronic difficulty initiating or maintaining sleep despite adequate opportunity, accompanied by daytime cognitive and emotional

impairment. Fragmented rapid eye movement sleep (REMS) and maladaptive affective responses in ID suggest REMS instability (REMSI) as a central mechanism. Complete silencing of noradrenergic neurons in locus coeruleus (LC) and associated norepinephrine (NE) decline during REMS are required for stable, emotionally restorative REMS, whereas stress-induced LC hyperactivation has been proposed to impair this silencing in ID. However, direct evidence for the causative role of REMSI in ID has not been elucidated. To address this gap, we sought to develop an animal model of REMSI with a closed-loop optogenetic system and examine whether chronic REMSI can lead to ID.

Methods: TH::Cre mice underwent stereotaxic surgery for EEG/EMG, virus injection for optogenetic stimulation of the LC (AAV5-EF1a-DIO-hChR2-EYFP), and measurement of NE dynamics in the medial prefrontal cortex (AAV9-hSyn-GRABNE2m, a genetically encoded fluorescent norepinephrine sensor). After 3 weeks of recovery, REMS-specific LC stimulation was performed for 1 week based on the real-time detection of REMS from 5-s EEG epochs using delta/theta power ratios.

Results: Preliminary experiments are expected to result in fragmented REM sleep, elevated NE levels during REM sleep, and prolonged sleep latency during the period of REMS-specific LC stimulation and to persist beyond the stimulation period. In addition, increased wake theta power and reduced NREM sleep are expected to be maintained after stimulation. Experimental results are pending.

Conclusion: These hypothetical findings would support the conclusion that LC hyperactivity during REMS is sufficient to induce insomnia-like sleep phenotypes, and that sustained REMS disruption may drive the transition from acute insomnia to chronic insomnia disorder. Further investigation is warranted.

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0060

MCH ANTAGONISM IMPROVES SLEEP-WAKE ABNORMALITIES IN A MOUSE MODEL OF PRADER-WILLI SYNDROME

Whidul Hasan¹, Satyajit Bandaru¹, Shaili Nandigam¹, Carrie Mahoney¹, Thomas Scammell², Ramalingam Vetrivelan¹

¹Beth Israel Deaconess Medical Center, ²Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital

Introduction: Most individuals with Prader-Willi Syndrome (PWS) suffer from significant sleep-wake abnormalities, including excessive daytime sleepiness and high levels of rapid eye movement (REM) sleep. The neural basis for these sleep abnormalities in PWS remains unclear. Based on previous studies from our lab and others, we hypothesized that the overactivity of melanin-concentrating hormone (MCH) neurons in the lateral hypothalamus contributes to sleep dysregulation in PWS.

Methods: 24-hour polysomnography followed by multiple sleep latency test was performed in order to determine the changes in spontaneous sleep-wake and sleepiness in Snord116del mice. Then to determine if higher MCH signaling contributes to sleep abnormalities in PWS, we a) examined any changes in MCH gene expression and MCH neuron counts in the lateral hypothalamus

and b) studied the changes in sleep-wake following intraperitoneal injections of an MCHR1 antagonist.

Results: Snord116del mice exhibit excessive sleepiness and substantially higher REM sleep levels akin to PWS humans. MCH neurons and gene expression are normal in these mice, but MCH receptor-1 antagonist reversed these sleep abnormalities.

Conclusion: Snord116del mice are appropriate animal models for investigating sleep dysregulation in PWS and MCH antagonism may be an effective approach for treating or managing PWS sleep symptoms.

Support (if any): Foundation for Prader-Willi Research (FPWR)

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0061

OREXIN NEURON CHEMOACTIVATION IMPROVES THE VENTILATORY RESPONSE TO HYPERCAPNIA IN A MOUSE MODEL OF OBESITY HYPOVENTILATION SYNDROME

Brenda Milla¹, Thomas Scammell²

¹Department of Neurology, Beth Israel Deaconess Medical Center, ²Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital

Introduction: Obesity Hypoventilation Syndrome (OHS) is characterized by impaired respiratory mechanics due to increased upper airway resistance, decreased chest wall compliance, and impaired central ventilatory drive to CO₂. Consequently, OHS patients develop chronic daytime hypercapnia that worsens during sleep when ventilatory drive is reduced. Current treatments for OHS are limited, warranting investigation of new therapies. Orexin neurons control wake/sleep behavior and project to brainstem respiratory centers to regulate breathing. We hypothesized that chemoactivation of orexin neurons would improve the hypercapnic ventilatory response (HCVR) in diet induced obesity (DIO) mice, a model of OHS.

Methods: We studied DIO orexin-cre mice which were fed a 60% high fat diet and lean orexin-cre mice which were fed normal chow. We stereotaxically injected the orexin field with AAV8-hsyn-DIO-hM3Dq-mCherry and surgically implanted EEG/EMG headstages. We measured respiratory activity across quiet wake, NREM, and REM sleep using whole body plethysmography chambers integrated with EEG/EMG. We exposed mice to ascending hypercapnia mixtures of 0, 3, 5, 8% CO₂ with 50% oxygen, balanced with nitrogen (one hour of each gas).

Results: About 42% of the orexin neurons expressed hM3Dq-mCherry. Treatment with CNO (0.3 mg/kg IP) increased the latency to enter REM sleep. With saline, DIO mice showed a blunted HCVR compared to lean mice. In lean mice, chemoactivation of the orexin neurons increased the frequency, tidal volume, and minute ventilation at moderate to high levels of CO₂ during quiet wakefulness and NREM sleep. Importantly, in DIO mice, chemoactivation increased tidal volume and minute ventilation across all CO₂ levels during quiet wake and NREM sleep.

Conclusion: These findings demonstrate that activation of the orexin neurons improves the hypercapnic ventilatory response in a mouse model of OHS. These results suggest that enhancing orexin signaling may improve hypoventilation in Obesity Hypoventilation Syndrome.

Support (if any): NIH HL149630 and Harvard Medical School Dean's Postdoctoral Fellowship

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0062

DIURNAL VARIATION IN SOMATOSENSORY INFORMATION PROCESSING IN CHRONIC INSOMNIA

Amar Jayasimha, Ritesh Netam, Renu Bhatia, Pratap Sharan, Nasreen Akhtar

All India Institute of Medical Sciences, New Delhi

Introduction: Increased somatosensory information processing is component of neurobiological model of chronic insomnia. Insomnia patients are highly sensitive to sensory stimuli, particularly at night. Our hypothesis is that insomnia patients have lower threshold for somatosensory information processing at night as compared to daytime.

Methods: In this study, 15 healthy controls and 12 insomnia patients were recruited. Quantitative sensory testing was used to assess peripheral somato sensory information processing before day-time nap and before night time sleep. Threshold levels of thermal detection, pain and pain tolerance in hot and cold modalities were determined.

Results: In healthy controls group, no significant difference was observed between night and afternoon time points for detection threshold for hot ($37 \pm 2.3^\circ\text{C}$ & $36 \pm 0.86^\circ\text{C}$, $p = >0.9999$), cold ($28 \pm 2.0^\circ\text{C}$ & $28 \pm 1.4^\circ\text{C}$, ($p=0.2061$), pain threshold of cold ($18 \pm 5.3^\circ\text{C}$ & $21 \pm 4.2^\circ\text{C}$, $p=0.2618$) and pain tolerance for hot ($47 \pm 3.3^\circ\text{C}$ & $47 \pm 1.5^\circ\text{C}$, $p=0.7695$), cold ($9.5 \pm 6.2^\circ\text{C}$ & $12 \pm 5.5^\circ\text{C}$, $p=0.1055$). Significant difference was observed between night ($43 \pm 3.4^\circ\text{C}$) and afternoon ($41 \pm 2.4^\circ\text{C}$) time points for pain threshold for hot ($p=0.0174$), pain onset is at a higher temperature for hot at night. In insomnia patients group, no significant difference is observed between night and afternoon for detection threshold for hot ($36 \pm 3.7^\circ\text{C}$ & $36 \pm 3.7^\circ\text{C}$, $p=0.7344$), cold ($27 \pm 3.4^\circ\text{C}$ & $28 \pm 2.9^\circ\text{C}$, $p=0.4691$), pain threshold for hot ($44 \pm 3.1^\circ\text{C}$ & $45 \pm 3.0^\circ\text{C}$, $p=0.7894$), cold ($15 \pm 6.3^\circ\text{C}$ & $15 \pm 6.3^\circ\text{C}$, $p=0.8117$), pain tolerance for hot ($48 \pm 1.4^\circ\text{C}$ & $49 \pm 0.93^\circ\text{C}$, $p=0.1591$), cold ($8.1 \pm 4.9^\circ\text{C}$ & $8.3 \pm 4.3^\circ\text{C}$, $p=0.7610$).

Conclusion: Healthy controls exhibit a circadian modulation of thermal nociceptive threshold (night $\uparrow$ threshold), consistent with intact nocturnal endogenous analgesic tone. Insomnia patients lack this diurnal modulation and show an altered sensory-affective pain profile: elevated hot-pain detection thresholds (hyposensitivity to nociceptive onset) combined with reduced suprathreshold tolerance at night, indicating preserved or enhanced central amplification of suprathreshold signals (impaired descending inhibitory control / exaggerated affective amplification) despite raised detection thresholds.

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0063

ROLE OF SENSORY NEURONS IN LOCAL INFLAMMATION-INDUCED HYPERSOMNIAShreesha Halder¹, Alban Latremoliere², Chloe Alexandre²¹Johns Hopkins University, ²Johns Hopkins School of Medicine

Introduction: Peripheral inflammation often causes sickness symptoms including fever, anorexia, pain, and increased sleep. Circulating cytokines contribute to most of these behaviors, but the mechanisms by which local inflammation increases sleep

remain unclear. Recent studies have evidenced a role for sensory neurons in detecting and responding to an infection. Here, we used a model of localized inflammation without fever to investigate the role of sensory neurons and inflammatory mediators in hypersomnia.

Methods: Adult male and female C57BL6j mice (10-12 weeks.) were instrumented for sleep (EEG/EMG electrodes) and body temperature (telemetry) recordings. To induce local inflammation, we injected Complete Freund's adjuvant (CFA) intra-knee (5uL) or intraplantarly (5-20uL). We tested the role of peripheral sensory neurons by (1) selectively silencing Na(v)1.8+ neurons using a Cre-dependent tetanus toxin approach and (2) surgically transecting the sciatic nerve and injecting CFA either into the denervated sciatic territory or the (intact) contralateral hind paw. To test the contribution of inflammatory mediators, we administered non-steroidal anti-inflammatory drugs (NSAIDs) at analgesic doses versus vehicle, or a systemic neutralizing anti-TNF α (tumor necrosis factor; 100 ug) antibody versus control IgG.

Results: CFA-induced local inflammation of the hind paw or knee joint increased both NREM and REM sleep selectively during the dark (active) phase for up to 5 days, compared to saline-injected animals, with no fever. NSAID treatment at doses that alleviated pain did not prevent or attenuate CFA-induced hypersomnia and systemic TNF- α blockade did not reduce CFA-induced hypersomnia relative to IgG controls. In contrast, genetic silencing of Na(v)1.8+ sensory neurons almost completely prevented the CFA-induced increase in sleep. Moreover, sciatic nerve transection markedly reduced the sleep increase when CFA was injected in the denervated paw.

Conclusion: Together these results suggest that the sleep increase during local inflammation is largely driven by peripheral sensory neurons innervating the inflamed area. These findings identify a direct neural pathway by which inflamed tissue promotes sleep and suggest that sensory-brain communication is a potential target for improving recovery from injury and inflammation.

Support (if any): Neurosurgery Pain Research Institute, NIH R01NS112266.

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0064

STK32A LINKS SLEEP HOMEOSTASIS TO SUPPRESSION OF SENSORY AND MOTOR SYSTEMSSteven Tran¹, Jasmine Emtage¹, Chaodong Zhang², Xiaoyao Liu³, Marina Lecoeuche¹, Grigorios Oikonomou¹, Sujatha Narayan⁴, Misha Ahrens⁴, Tsui-Fen Chou¹, Min Xu³, Qinghua Liu², David Prober¹¹California Institute of Technology, ²Tsinghua University,³Chinese Academy of Sciences, ⁴Janelia Research Campus

Introduction: Sleep is regulated by a homeostatic process and associated with an increased arousal threshold, but the genetic and neuronal mechanisms that implement these essential features of sleep remain poorly understood.

Methods: To address these fundamental questions, we performed a zebrafish genetic screen informed by human genome-wide association studies.

Results: We found that mutation of serine/threonine kinase 32a (stk32a) results in increased sleep and impaired sleep homeostasis in both zebrafish and mice, and that stk32a acts downstream of neurotensin signaling and the serotonergic raphe in zebrafish.

stk32a mutation reduces phosphorylation of neurofilament proteins, which are co-expressed with stk32a in neurons that regulate motor activity and in lateral line hair cells that detect environmental stimuli, and ablating these cells phenocopies stk32a mutation. Neurotensin signaling inhibits specific sensory and motor populations, and blocks stimulus-evoked responses of neurons that relay sensory information from hair cells to the brain.

Conclusion: Our work thus shows that stk32a is an evolutionarily conserved sleep regulator that links neuropeptidergic and neuromodulatory systems to homeostatic sleep drive and changes in arousal threshold, which are implemented through suppression of specific sensory and motor systems.

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0065

IMMUNITY TO HYPOCRETIN AND INFLUENZA A IN PATIENTS WITH NARCOLEPSY TYPE 1 AND TYPE 2

Shuang Yue, Fang Han

Peking University People's Hospital

Introduction: Narcolepsy type 1 (NT1) is caused by the loss of hypocretin/orexin (HCRT) neurons and is strongly associated with human leukocyte antigen (HLA)-DQA1*01:02/DQB1*06:02 (DQ0602, ~98%). Antigen-specific T cell responses suggest adaptive immunity against HCRT and pH1N1/Pandemrix in NT1. However, the mechanisms behind HCRT neuron loss and the molecular mimicry between influenza A and HCRT remain unclear, and immune responses in NT2 are largely unexplored.

Methods: Using DQ0602 DNA-barcoded (dCODE) dextramers loaded with pHA273-287, NP17-31, and HCRTNH2 peptides, we characterized peptide-DQ0602 (pDQ0602)-restricted CD4+ T cells in peripheral blood mononuclear cells from DQ0602-positive NT1, NT2, and healthy controls (HC), followed by single-cell RNA sequencing (scRNA-seq). Additionally, cerebrospinal fluid (CSF) cells were incubated with dextramers with a panel of 16 peptides and subsequently analyzed by scRNA-seq.

Results: We found a significantly higher frequency of pDQ0602-restricted CD4+ T cells reactive to HCRTNH2, pHA273-287, and NP17-31 in the PBMCs of DQ0602-positive NT2 patients compared with NT1 patients and HC. Close-to-onset NT2 patients (≤ 12 months) showed higher frequencies of pDQ0602-restricted CD4+ T cells than late-onset patients (> 12 months), particularly significant for HCRT54-66-NH2 and NP17-31, whereas NT1 showed no such trend. In those patients (mainly NT1) under follow-up, we observed an initial increase followed by a subsequent decrease in pDQ0602-restricted CD4+ T cells among narcoleptic patients with at least two clinical visits, with mean intervals of 18.0 and 41.6 months, respectively. Furthermore, we detected a tendency toward higher frequencies of B cells, CD4+ T cells, and pDCs in the CSF of narcoleptic patients, and significantly higher frequencies of CD69+CD44+ Tem, CD69-CD44+Tcm, and CD69-CXCR4- Teff cells among CSF CD4+ T cells in NT1 patients. Lastly, we found that an N-terminal HCRT peptide, HCRT25-39, was recognized by

a large number of NT1 TCR clones, suggesting a potential immune target in NT1.

Conclusion: This work provides evidence for the antigen-specific immune response targeting HCRT and influenza A antigens in NT2, suggesting disease progression from NT2 to NT1, particularly in DQ0602-positive individuals.

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0066

LONGITUDINAL IMPACT OF AQUAPORIN-4 GENE VARIANTS ON COGNITION AND BRAIN DIFFUSIVITY

Sang Min Paik¹, Min-Hee Lee², Seung Ku Lee², Soriul Kim², Ali Siddiquee², Jae Rim Kim¹, Robert Thomas³, Nan Hee Kim², Chul Shin², Chang-Ho Yun¹

¹Department of Neurology, Seoul National University Bundang Hospital, Seoul National University College of Medicine,

²Institute of Human Genomic Study, College of Medicine, Korea University, ³Beth Israel Deaconess Medical Center

Introduction: Genetic variants of aquaporin-4 may influence glymphatic clearance through water transport, yet their longitudinal effects on brain structure and cognition are unclear. We investigated how aquaporin-4 variants affect changes in cognition, and mean diffusivity measured from diffusion tensor imaging (DTI), as well as the mediating role of these neuroimaging measures, over four years in a community-based cohort.

Methods: We studied 938 adults (mean age 58 ± 6 years; 480 women) who underwent DTI and cognitive assessments at baseline and four-year follow-up. To examine the effect of aquaporin-4 variants, we selected three aquaporin-4 variants (rs16942851, rs335929, and rs335931). Participants were categorized into two haplotypes (TAA [major], GCG [minor]). We assessed proportional changes in cognition, and mean diffusivity, and performed mediation analyses to determine whether these imaging markers mediated the association between haplotypes and cognitive decline. A multiple linear regression model was used to determine statistical significance, adjusting for age, sex, body mass index, education, Apolipoprotein E $\epsilon 4$ carrier status, current drinking, current smoking, hypertension, and diabetes at baseline.

Results: Individuals with the minor haplotype showed significantly reduced mean diffusivity in the right orbital inferior frontal gyrus (-1.71% [95% confidence interval -5.48 to -1.81]), right insula (-0.97% [-1.56 to -0.37]), right choroid plexus (-2.12% [-3.35 to -0.89]), and left pericalcarine white matter (-0.80% [-1.19 to -0.41]), along with greater declines in story recall-recognition (-2.43% [-4.07 to -0.80]) and digit symbol coding (-2.08% [-3.60 to -0.56], all corrected P-values < 0.05). Mediation analysis indicated that reduced mean diffusivity in the right orbital inferior frontal gyrus and right choroid plexus, mediated the relationship between haplotypes and sustained attention decline, while changes in the left pericalcarine area mediated verbal memory decline.

Conclusion: Aquaporin-4 variants appear to influence microstructural integrity and cognitive performance over time, suggesting a potential genetic target for modulating perivascular clearance and mitigating neurodegenerative risk.

Support (if any): This study was also conducted with bioresources from National Biobank of Korea, the Center for Disease Control and Prevention, Republic of Korea (NBK-2020-093 and NBK-2021-014). This research was supported by the Korea Centers for Disease Control and Prevention (2011-E71004-00, 2012-E71005-00, 2013-E71005-00, 2014-E71003-00, 2015-P71001-00, 2016-E71003-00, 2017-E71001-00, and 2018-E7101-00).

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0067

LONGITUDINAL IMPACT OF AQUAPORIN-4 GENE VARIANTS ON PERIVASCULAR DIFFUSIVITY

Min-Hee Lee¹, Seung Ku Lee¹, Soriul Kim¹, Ali Siddiquee¹, Sang Min Paik², Jae Rim Kim², Robert Thomas³, Nan Hee Kim¹, Chol Shin¹, Chang-Ho Yun²

¹Institute of Human Genomic Study, College of Medicine, Korea University, ²Department of Neurology, Seoul National University Bundang Hospital, Seoul National University College of Medicine, ³Beth Israel Deaconess Medical Center

Introduction: Aquaporin-4 water channels play a key role in glymphatic clearance of brain metabolites, and their variants may alter glymphatic function and interstitial fluid dynamics. We investigated how aquaporin-4 variants affect changes in diffusion tensor imaging analysis along the perivascular space (DTI-ALPS) that estimates directional water diffusivity within the perivascular space, as well as the mediating role of DTI-ALPS between aquaporin-4 diplotype and cognitive performance changes, over four years in a community-based cohort.

Methods: We studied 938 adults (mean age 58±6 years; 480 women) who underwent DTI and cognitive assessments at baseline and four-year follow-up. Three aquaporin-4 variants (rs16942851, rs335929, and rs335931) were used to categorize participants into three groups according to the aquaporin-4 diplotype: major-diplotype (n=318), hetero-diplotype (n=456), and minor-diplotype (n=164). Longitudinal changes in DTI-ALPS were examined using linear mixed model with random intercepts, adjusting for age, sex, body mass index, education, Apolipoprotein E ε4 carrier status, current drinking, current smoking, hypertension, and diabetes, and total sleep time, sleep efficiency, and the baseline values of DTI-ALPS. Mediation analyses were performed to determine whether DTI-ALPS mediated the association between aquaporin-4 diplotype and cognitive changes.

Results: The minor-diplotype exhibited a significantly greater decline in DTI-ALPS over time than the major-diplotype (-0.133, [-0.23, -0.04], P=0.007), whereas the hetero-diplotype showed no difference (-0.035, [-0.11, 0.04], P=0.349). Longitudinal changes in DTI-ALPS significantly mediated the effects of aquaporin-4 diplotype on changes in visual reproduction scores, including immediate recall (-0.053, [-0.096, -0.011], P=0.012), delayed recall (-0.053, [-0.096, -0.009], P=0.009), and recognition (-0.017, [-0.033, -0.001], P=0.010).

Conclusion: Aquaporin-4 diplotype was associated with longitudinal declines in DTI-ALPS, suggesting variant-related vulnerabil-

ity in glymphatic function. Furthermore, the mediation results indicate that reduced perivascular diffusivity could be a pathway that underlies the association between aquaporin-4 variants and visual memory change over time.

Support (if any): This study was also conducted with bioresources from National Biobank of Korea, the Center for Disease Control and Prevention, Republic of Korea (NBK-2020-093 and NBK-2021-014). This research was supported by the Korea Centers for Disease Control and Prevention (2011-E71004-00, 2012-E71005-00, 2013-E71005-00, 2014-E71003-00, 2015-P71001-00, 2016-E71003-00, 2017-E71001-00, and 2018-E7101-00).

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0068

ROLE OF MELANOCORTIN 4 RECEPTOR SIGNALING IN SLEEP-DISORDERED BREATHING

Md Tarikul Islam,, Mi-Kyung Shin, Noah R. Williams, Dashdulam Davaanyam, Melanie Alexis Ruiz, Cole Winston, David Mendelowitz, Vsevolod Y. Polotsky
George Washington University

Introduction: Obstructive sleep apnea (OSA) affects many people throughout the world and is a leading cause of cardiovascular morbidity and mortality. One of the major causes of OSA is loss of genioglossus (GG) muscle tone during sleep. Emergent pharmacotherapy has limitations and new drugs with better potential to treat OSA are required. We have previously shown that diet-induced obese (DIO) mice develop OSA and melanocortin 4 receptor (MC4R) agonist setmelanotide (SET) could be used for OSA treatment. We have also shown MC4R agonists act in the retrotrapezoid nucleus (RTN) to augment hypercapnic ventilatory response (HCVR). We hypothesized that SET treats OSA by increasing GG muscle tone and that effects of setmelanotide on sleep and breathing can be localized to the MC4R on the RTN neurons.

Methods: We transfected DIO MC4R-Cre mice with adeno-associated virus (AAV) harboring excitatory designer receptor exclusive activated by designer drugs (DREADD) and DIO MC4R-flox mice with AAV-Cre-recombinase (icre) into the RTN. Transgenic and C57BL/6J mice were headmounted with EEG and GG and nuchal EMG electrodes. Sleep and HCVR studies (8% CO₂ challenge) were performed in the plethysmography chamber.

Results: SET (1 mg/kg, i.p) significantly increased GG muscle activity during NREM sleep (SET: 0.86 ± 0.08 vs. Veh: 0.48 ± 0.04 a.u.; p < 0.005), REM sleep (SET: 0.38 ± 0.05 vs. Veh: 0.27 ± 0.04 a.u.; p < 0.05) and during HCVR (SET: 2.04 ± 0.25 vs. Veh: 1.25 ± 0.11 a.u.; p < 0.05). Experiments in MC4R-Cre mice showed that RTN-MC4R neurons activation by DREADD ligands increased sleep efficiency (Veh: 49.69 ± 0.02% vs. J60: 58.07 ± 0.03% of the light phase). Experiments in MC4R-flox mice showed that MC4R knockdown in RTN abolished effects of SET on HCVR (control, SET: 0.29 ± 0.02 vs. Veh: 0.25 ± 0.03; p < 0.05; MC4R knockdown, SET: 0.17 ± 0.03 vs. Veh: 0.19 ± 0.04; p > 0.05).

Conclusion: Our study suggests SET targets RTN-MC4R neurons to augment HCVR and treats OSA by improving GG muscle activity. Furthermore, RTN-MC4R neurons activation can increase total sleep time.

Support (if any): R01 HL174409

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0069

SLEEP EFFICIENCY AND MEMORY-RELATED BRAIN FUNCTIONAL CONNECTIVITYYakun Zhang¹, Yanchen Guo¹, Shichun Chen¹, Xiang He², Maciej Nowakowski³, Weiying Dai¹¹State University of New York at Binghamton, ²Northwell Health and Feinstein Institutes for Medical Research, ³United Health Services Hospitals, Inc

Introduction: Sleep plays a critical role in memory consolidation, yet the impact of chronic sleep deficiency on functional connectivity (FC) in key memory-related regions, such as the hippocampus (HPC) and posterior cingulate cortex (PCC), remains unclear. Traditional BOLD fMRI suffers from signal dropout near air-tissue interfaces, limiting its ability to reliably assess FC in the HPC. Dynamic arterial spin labeling (DASL) offers a potential solution by providing more robust perfusion-based measures of FC. In this preliminary study, we examine how sleep efficiency relates to HPC and PCC FC using both BOLD and DASL imaging.

Methods: Fourteen patients (60±16 years; 8 females) who underwent clinical polysomnography (PSG) were recruited, and sleep efficiency was scored by certified technicians. MRI data were acquired on a 3T Siemens Prisma and included a 5-minute BOLD scan, a 5-minute DASL scan using background-suppressed pseudo-continuous arterial spin labeling (PCASL), and a high-resolution T1-weighted structural image. Seed-based FC for the PCC and left HPC (LHPC) was calculated using voxel-wise Pearson correlations followed by Fisher Z-transformation. Associations between sleep efficiency and FC were assessed using multiple linear regression with ANCOVA controlling for global signals, along with correction applied for multiple comparisons.

Results: Sleep efficiency was significantly associated with FC in both the PCC and LHPC. Using BOLD, higher sleep efficiency was associated with increased PCC FC in the anterior cingulate and medial orbitofrontal cortex, regions within the default mode network (DMN). Using DASL, higher sleep efficiency was associated with increased PCC FC in the left insula, a key node of the salience network (SN), as well as increased LHPC FC in the right supra-marginal and superior temporal region, which are components of the DMN.

Conclusion: Higher sleep efficiency was associated stronger FC between memory-related regions and major large-scale networks, including the DMN and SN. These findings suggest that reduced sleep efficiency may disrupt network-level connectivity patterns supporting memory and attention. Such disruptions may contribute to the neural mechanisms linking poor sleep to impaired memory consolidation and increased vulnerability to memory decline and dementia. Future work will integrate automating sleep-efficiency estimation into our modeling framework.

Support (if any): Transdisciplinary Areas of Excellence seed grant at Binghamton University

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0070

WITHDRAWN FROM PUBLICATION

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0071

HYPOXIC BURDEN: A RISK FACTOR FOR DEFICITS IN CSF MOBILITY SUPPORTING BRAIN WASTE CLEARANCE?Gawon Cho¹, Korey Kam², Adam Mecca³, Helene Benveniste³, Brienne Miner³, Andrew Varga²¹Yale University, ²Mount Sinai School of Medicine, ³Yale School of Medicine

Introduction: Obstructive sleep apnea (OSA) involves repeated airway obstruction during sleep that causes intermittent hypoxemia and respiratory-effort-related sleep fragmentation. Glymphatic transport, a brain waste clearance process driven by cerebrospinal fluid (CSF) movement, depends on stable vascular pulsations and their coordination with CSF flow, both of which may be disrupted by hypoxic vascular injury and fragmented sleep. However, the association between OSA and glymphatic transport, and whether hypoxic burden or sleep fragmentation drives this relationship, remains unknown.

Methods: This study examined the association of OSA diagnosis, hypoxic burden, and respiratory-effort-related sleep fragmentation with CSF mobility in 32 middle-aged and older adults. OSA was assessed via in-lab polysomnography or WatchPAT home testing. Hypoxic burden was quantified as T90 (i.e., time spent under 90% oxygen saturation). To examine distinct pathways, sleep fragmentation was defined as non-hypoxic respiratory effort related arousals (NH-RERAs), computed as the respiratory disturbance index minus the apnea hypopnea index using the 4% criterion (AHI4%). CSF mobility was defined as gBOLD-CSF coupling, which represent anti-coupling strength between gray matter blood oxygen dependent signals, a measure of cerebral blood flow, and ventricular CSF flow. gBOLD-CSF coupling was assessed using a 9 to 15 minute resting-state fMRI scan (TR=1.5 seconds, voxel size=1.5mm3) collected on a 7T scanner. A hierarchical approach was used to model gBOLD-CSF coupling as a linear function of T90, NH-RERAs, age, and sex.

Results: Mean age was 66 (SD=6.32), 59% were female, and 63% identified as White. Seventy percent had moderate to severe OSA (AHI4%≥15). T90 averaged 23.4 minutes (SD=48.4), and NH-RERAs averaged 6.9 events/hour (SD=6.7). Moderate to severe OSA was associated with lower gBOLD-CSF coupling (Δ gBOLD-CSF=0.25, $p=0.002$). In hierarchical models, longer T90 predicted reduced gBOLD-CSF coupling ($\beta=0.002$, $p=0.03$) and T90 explained unique variance beyond NH-RERAs and covariates ($\Delta R^2=0.15$, $F=5.03$, $p=0.03$). NH-RERAs were not associated with gBOLD-CSF coupling. Posthoc analyses found that lower mean oxygen saturation was likewise associated with reduced gBOLD-CSF coupling ($\beta=-0.05$, $p=0.02$).

Conclusion: OSA may be a risk factor for deficits in CSF mobility needed for brain waste clearance, with hypoxic burden rather than respiratory effort related sleep fragmentation as the primary driver.

Support (if any): This study was supported by the NIH (R01AG066870) and the Alzheimer's Association (AARFD-24-1306796).

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0072

INFANT SLEEP AT 9 MONTHS PREDICTS LANGUAGE SKILLS AT 12 MONTHSNoelia Flores, Melissa Horger, Jennifer Holmes, Rebecca Spencer
University of Massachusetts Amherst

Introduction: Habitual sleep patterns in infants and children have been linked to developmental outcomes such as language. In children, language development is positively associated with sleep consolidation, efficiency, and duration. Studies examining this relationship in infants are less consistent; one found frequent daytime naps among infants and toddlers predicted vocabulary growth 3-6 months later, while another found more consolidated sleep at 18 months predicted language skills at 5 years. Conversely, frequent night awakenings are consistently associated with poorer language development. We sought to determine key sleep features that predict language learning in infancy.

Methods: 9-month-old infants ($n=18$) wore an actigraph (GENE-Activ) on their ankle for up to 16 days ($M = 11.5$ days). Actigraphy was used to objectively measure infants' sleep duration, timing (sleep onset latency, midpoint, and consolidation ratio [total nap time/night sleep time]) and quality (sleep efficiency, wake after sleep onset [WASO]). Infants' expressive and receptive language skills at 12- and 15 months were measured using the Bayley Scales of Infant and Toddler Development.

Results: Among the sleep timing variables, only their consolidation ratio was significantly related to receptive language ($R^2=.223$, $p=.037$; all other p 's $>.05$). Nighttime sleep efficiency at 9 months was positively related to both receptive ($R^2=.255$, $p=.027$) and expressive ($R^2=.278$, $p=.02$) language scores at 12 months. Nighttime WASO was negatively related with receptive ($R^2=.332$, $p=.019$) and expressive ($R^2=.356$, $p=.014$) language scores at 12 months. Nine month sleep features were not associated with language scores at 15 months.

Conclusion: Measures of both sleep timing and quality at 9 months were related to language scores at 12 months. Increased sleep efficiency and decreased WASO predicted higher expressive and receptive language scores. Our finding adds to prior research that fewer night awakenings may benefit language development. Additionally, a greater ratio of daytime to nighttime sleep was associated with better receptive language outcomes, indicating that longer and/or more frequent daytime naps may be beneficial for receptive language development at this age point.

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0073

SLEEP-RELATED ATTENTIONAL BIAS IN YOUTH INSOMNIA – EYE-TRACKING EXPERIMENT WITH HIERARCHICAL DRIFT-DIFFUSION MODELLING (HDDM)Tsz Kwan Hui¹, Tommy Ho-Fung Chung², Toby Wise³, Panagis Drakatos¹, David O'Regan¹, Rachel Ngan Yin Chan⁴, Joey Wing Yan Chan⁴, Ka-Sin Caroline Shea⁴, Jihui Zhang⁴, Albert Martin Li⁵, Yun Kwok Wing⁴, Rachel Manber⁶, Alice Gregory⁷, Shirley Xin Li⁸, Ivana Rosenzweig⁴

¹Sleep and Brain Plasticity Centre, Department of Neuroimaging, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, ²Department of Psychology, University of Hong Kong, ³Department of Neuroimaging, Institute of

Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, ⁴Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, Chinese University of Hong Kong, ⁵Department of Paediatrics, Faculty of Medicine, Chinese University of Hong Kong, ⁶Department of Psychiatry and Behavioral Sciences, Stanford University, ⁷Department of Psychology, University of London, ⁸Department of Psychology, University of Hong Kong, Hong Kong Special Administrative Region

Introduction: Sleep-related attentional bias has long been proposed as a maintaining factor in insomnia, yet reaction-time studies in youth have yielded decidedly mixed results. We therefore combined eye-tracking with hierarchical drift-diffusion modelling (HDDM) to examine whether eye-movement is associated with altered attention and decision making process in youth with insomnia.

Methods: Seventy-five youth (mean age 17.43 years, 65.33% female) with DSM-5 insomnia and sixty-nine healthy sleepers (mean age: 16.74 years, 62.32% female) completed a dot-probe task presenting sleep-related and neutral image pairs during eye-tracking. First fixation onset latency (FFOL), first fixation duration (FFD) and total fixation duration (TFD) were derived for each image type. Conventional attentional-bias indices and 2×2 ANOVAs (Group $\times$ Stimulus type) were calculated. HDDM first estimated baseline drift rate (v) and response threshold (a), and then fitted regression models in which trial-level eye-movement metrics and probe location (sleep-prompting vs non-sleep-prompting) predicted v and a , with starting point (z) and non-decision time (t) treated as random intercepts. Models were compared by deviance information criterion (DIC).

Results: Groups did not differ in reaction-time-based attentional-bias scores, nor were there Group $\times$ Stimulus type interactions for any eye-movement metric. Baseline HDDM demonstrated a lower global drift rate in adolescents with insomnia relative to healthy sleepers, with no group difference in response threshold. Across both groups, longer TFD to either sleep-related or neutral images interacted with probe location to predict higher response thresholds: prolonged fixation was associated with increased threshold when the probe required a response away from the originally fixated location. No robust effects emerged for drift rate or for other eye-movement predictors.

Conclusion: Computational modelling of eye-movement patterns reveals underlying attentional and decision-making processes that are not apparent in conventional attentional-bias indices. Specifically, youth with insomnia showed a reduced efficiency in global information processing. However, both youth with insomnia and healthy sleepers showed cautious response during disengagement, which revealed no specific effects in insomnia. Future studies should adopt other computational models to further delineate the underlying cognitive process in youth with insomnia.

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0074

ACTIGRAPHIC SLEEP-BASED MACHINE LEARNING PREDICTION OF COGNITIVE IMPAIRMENTAmy Costa¹, Mahmoud Elkhadrawi¹, Daniel Buysse¹, Meryl Butters¹, Lisa Barnes², Andrew Lim³, Murat Akcakaya¹, Meredith Wallace¹

¹University of Pittsburgh, ²Rush University Medical Center,

³University of Toronto

Introduction: Cognitive impairment is currently undetected in primary care in up to 80% of affected patients. Therefore, it is crucial to improve ways to easily screen for dementia. Identifying common risk factors and correlates, such as sleep health, could prompt targeted, easy to employ, dementia screening. The present study utilized machine learning to test if actigraphic sleep-based measures can distinguish older adults with cognitive impairment from those who are cognitively healthy, and to identify which actigraphy variables may be driving the predictive potential of the model.

Methods: 1,308 participants from the Rush Memory and Aging Project (MAP) contributed actigraphy, medical history, and cognitive data from N=4,839 annual visits (Mbaseline age=81.4±7.4 years, 999 women). At each visit, participants were categorized as cognitively healthy (N0=3,593) or cognitively impaired (Mild Cognitive Impairment, Alzheimer's Disease, or other dementia; N1=1,246). In the model, 6 behavioral sleep, 7 rest-activity rhythm (RAR; estimated using extended cosine models), and 7 non-parametric RAR actigraphic-derived features were used. In addition, 14 demographics, 13 medical conditions, 106 medication usage, and 28 health behaviors features were used in the model. A machine learning classifier (XGBoost) was used for the cognitive impairment/no cognitive impairment prediction task. A 3-fold cross-validation framework was used to train and validate models. Feature importance was analyzed with Shapley values to identify the most influential features.

Results: The model achieved an aggregated area under the curve (AUC)-ROC of .77, an average precision of .58, and an accuracy of 70%. Shapley results revealed relative amplitude (RA) and inter-daily stability (IS) are two of the top 25 most influential features in the model. Specifically, lower RA and IS are correlated with higher risk of cognitive impairment.

Conclusion: Overall, results show potential for actigraphic sleep-based measures to predict if an individual has cognitive impairment, when paired with other demographic and risk factors. Future studies should investigate if RA and IS are potential treatment targets for reducing cognitive impairment.

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0075

DANCERS IN THE DARK: DO SLEEP TWITCHES PREDICT SLEEP-DEPENDENT CONSOLIDATION OF WHOLE-BODY MOTOR LEARNING?

Tracy Uzoigwe¹, Emory Slane¹, Andrew Palermo¹, Taylor Christiansen², Greta Sokoloff², Mark Blumberg², Katharine Simon¹, Sara Mednick¹, Lydia Karr²

¹University of California, Irvine, ²University of Iowa

Introduction: Though sleep is crucial for motor memory consolidation, the brain mechanisms underlying its role in real-world, whole-body movement, such as dance, remain poorly understood. Here, we examine how daytime naps and specific features of sleep, such as twitches during REM sleep, impact improvement across a three-day dance-learning protocol.

Methods: Nineteen adults (12 females, 7 males) completed three days of dance classes, learning a standardized choreography. Each participant took one baseline nap before any training and one

experimental nap that occurred on either Day 1, Day 2, or Day 3, followed by a post-nap dance test to assess nap-dependent improvement. We developed a method to systematically evaluate dance performances from video, based on four error types: detail (incorrect movement execution), order (sequence mistakes), omission (missing moves), and addition (extra unintended movements). For each nap, we calculated the rate of twitching (twitches/min) and the proportion of twitching for each body part. We used repeated-measures ANOVA, linear mixed-effects models, and Tukey-adjusted comparisons to evaluate learning, nap timing, and twitch characteristics.

Results: In preliminary analyses, we observed robust learning across days, with a significant linear reduction in error scores across the three classes. Given the strong linear effect of learning across classes, we examined the nap effect while controlling for this linear learning effect. Nap day significantly predicted post-nap performance change, with naps on Day 1 showing significant improvement, and naps on Days 2 and 3 having minimal effects. We compared twitching between the baseline nap (pre-dance class) and the experimental naps for each body part. Twitching differed by region, with hand twitches decreasing and foot twitches increasing from baseline to experimental naps.

Conclusion: Though data collection is ongoing, these early findings indicate that earlier naps yield larger performance benefits during whole-body motor learning, and the body regions most engaged during dancing (feet) showed more twitching after learning. Our findings suggest a systematic approach to studying whole-body motor learning and sleep.

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0076

EFFECT OF A TRYPTOPHAN ENRICHED DIET ON MOOD, COGNITION, SLEEP AND THEIR ASSOCIATED NEUROTRANSMITTERS/HORMONES IN A MOUSE MODEL OF DOWN SYNDROME

Elsa Pittaras, Tula Kurashige, Sadie Peroulas, Stella Lopez, Lauren Chan, Craig Heller
Stanford University

Introduction: Down's Syndrome (DS), caused by triplication of genes on human chromosome 21, occurs in ~1 in 800-1000 live births. Individuals with DS display cognitive disabilities, mood and sleep impairment but also a chronic deficit in Tryptophan (TRP). TRP is the precursor of melatonin, involved in circadian control of sleep, and serotonin, involved in mood and cognitive functions. TRP enriched diet (TRPeD) has been shown to improve mood, sleep and cognition in other psychopathologies like Alzheimer disease or depression, that share common features with DS. However, no study has focused on the potential beneficial effect of TRPeD in the context of DS.

Methods: We conducted the first study testing the hypothesis that TRPeD will improve mood, cognition and enhance sleep, in a mouse model of DS, and that these improvements will be reflected in the level of associated neurotransmitters/hormones. To do so, we tested mood, cognitive abilities, and we monitored the sleep, of mouse model of DS, and their control, before and after 4 weeks under control or TRPeD.

Results: We showed that a TRPeD improves long term and short-term memory, mood, but not social behavior. TRPeD also

decreased the proportion of DS mice taking risky decisions in a decision-making task. The TRPeD also improved the sleep quality and quantity of a mouse model of DS.

Conclusion: Our study is the first one showing that dietary supplements improve cognition and sleep in a mouse model of DS. In the future, we aim at measuring the level of TRP, serotonin and melatonin in the brain and the blood of our animal to correlate the cognitive and/or sleep improvement with the molecular level of the associated neurotransmitters/hormones.

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0077

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0078

EYE OF THE BEHOLDER: RESPONSE SURFACE ANALYSIS OF SUBJECTIVE-OBJECTIVE COGNITION ACROSS ACTIGRAPHIC SLEEP IN OLDER ADULTS

Amy Costa¹, Christina McCrae², Jennifer O'Brien², Meredith Wallace¹, Ashley Curtis³

¹University of Pittsburgh, ²University of South Florida, ³Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida

Introduction: A discrepancy between subjective and objective measures of cognition may indicate those at risk for missed cognitive impairment diagnosis in older adults. Past work of ours suggests aspects of sleep may impact associations between subjective and objective cognition in cognitively healthy older adults. A critical next step is to distinguish how the direction (e.g., how the relationship differs if objective cognition is low vs. high) and degree (e.g., magnitude) of the discrepancy is associated with sleep, to identify those at risk for missed cognitive impairment diagnosis. Therefore, the present study extended past work by investigating how the direction and degree of the subjective-objective cognition discrepancy is related to actigraphic sleep in older adults.

Methods: Cognitively healthy older adults (N=37, Mage=69.4±4.9 years, 35 women) completed cognitive tasks [Stroop Color Word (inhibition), Posner Cueing (exogenous and endogenous orienting attention), Sternberg (working memory)], Cognitive Failures Questionnaire, and wore a GENEActiv actiwatch for 2 weeks [sleep onset latency (SOL), total sleep time (TST), sleep efficiency]. Polynomial regressions were used to test if the interaction between subjective and objective cognition was associated with actigraphic sleep, controlling for depressive symptoms and number of medications. If the interaction was significant, response surface analyses were used to probe the interaction to test the direction or degree of concordance and discrepancy between cognition measures across varying levels of sleep.

Results: The interaction between cognitive complaints and exogenous orienting attention was significantly associated with SOL ($\beta=-.78$, $p=.02$). Response surface analysis contrasts revealed a significant degree of discrepancy (contrast-estimate=1.86, $p=.008$), suggesting SOL increases as the subjective-objective cognition discrepancy gets larger in either direction.

Conclusion: Greater subjective-objective cognition discrepancy, regardless of direction, is associated with longer objective SOL, while a smaller discrepancy is associated with shorter Interestingly, there were no significant associations for TST or sleep efficiency. Findings may reflect a shared hyperarousal mechanism (e.g., insula or amygdala neural activity), which may interfere with prefrontal-mediated self-appraisal of cognitive functioning. Future studies should investigate SOL as a potential treatment target for reducing the discrepancy between cognition measures, with the aim of reducing missed cognitive impairment diagnosis.

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0079

IRREGULAR SLEEP IMPAIRS VERBAL AND MEMORY ABILITIES IN EARLY CHILDHOOD

Karolina Rusin¹, Jennifer Holmes¹, Christine St Laurent¹, Lindsey Mooney², Rebecca Spencer¹

¹University of Massachusetts, Amherst, ²University of California, Davis

Introduction: Sleep regularity, including low variability in sleep timing and duration, is one of the emerging markers of sleep health. It has been consistently linked with cognitive, emotional, and physical health, with highly variable sleep predicting negative outcomes. Yet, to date, most research regarding irregular sleep and cognitive performance has focused on adolescents and adults. The objective of this study was to examine the relationships between sleep regularity and cognitive outcomes in a sample of preschool-age children.

Methods: Participants were 379 preschool-age children (M=4.3 years, SD=0.78 years). Sleep was assessed using actigraphy-derived measures of regularity, including individual standard deviation of sleep midpoint and sleep duration, and social jetlag. Cognitive outcomes were measured via three separate tasks. Receptive vocabulary was assessed using the standardized scores from the Peabody Picture Vocabulary Test (PPVT-4, n=322). Visuospatial memory was measured by accuracy scores on a memory grid task (n=62). Executive attention was assessed by a preschool-adapted flanker task (n=60).

Results: On average, individual sleep duration varied by 59.5 min (Range=7.8-151.7 min) and sleep midpoint varied by 32.2 min (Range= 4.8-142.8 min). Additionally, the mean social jetlag was 27.6 minutes (Range= 0 - 120 min). Receptive vocabulary scores were significantly associated with variability in sleep midpoint ($r(316) = -.023$, $p < .0001$), variability in sleep duration ($r(318) = -.021$, $p < .0001$), and social jetlag ($r(292) = -.026$, $p < .0001$), even after controlling for sleep duration. Performance on the visuospatial memory task was only affected by variability in sleep midpoint ($r(53) = -.03$, $p=.03$) and social jetlag ($r(48) = -.045$, $p < .0001$), but not variability in sleep duration ($r(53) = -.004$, $p=.75$). The executive attention task was not related to any of the measures of sleep variability (all $p>.05$).

Conclusion: Findings support previous research documenting the negative impact of irregular sleep, which remains even after accounting for sleep duration. Specifically, children's verbal and memory abilities are susceptible to these inconsistent sleep patterns. Surprisingly, however, children's executive attention was not related to sleep variability measures, which suggests that not all cognitive outcomes are equally impacted.

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0080

POOR SLEEP HYGIENE IN ADOLESCENCE IS ASSOCIATED WITH DISRUPTED ENCODING AND CONSOLIDATION OF NEWLY LEARNED WORDSRebecca Crowley¹, Jessie Ricketts¹, Lisa Henderson², Gareth Gaskell², Jakke Tamminen¹¹Royal Holloway, University of London, ²University of York

Introduction: Sleep before learning restores hippocampal encoding capacity (Cirelli & Tononi, 2020), while sleep after learning stabilises and integrates new memories into long-term neocortical stores (Klinzing et al., 2019). Both functions of sleep are known to facilitate word learning in adults and young children (Davis & Gaskell, 2009; March et al., 2023). Yet, little is known about these mechanisms in adolescence, despite adolescence being a developmental period marked by considerable disruption to sleep. These disruptions include shifts in circadian rhythms that delay sleep timing, alongside behavioural factors like increased device use before bed. Together, these changes lead to chronic sleep restriction (Gradisar et al., 2011). We therefore hypothesised that the transition from pre-adolescence to adolescence would lead to poorer sleep and worse encoding and consolidation of new words.

Methods: Participants (225 11-12-year-olds and 263 13-15-year-olds) completed a word learning task across two sessions spaced 24 hours apart, testing immediate encoding and overnight consolidation. Sleep was assessed via self-report questionnaires as well as a 2-week sleep diary prior to testing. Objective measures of sleep were derived from actigraphy in a subsample of participants.

Results: Bayesian mixed effects models revealed substantial differences between age groups. Older adolescents exhibited stronger evening chronotypes, later sleep onset (41 mins later), shorter duration (44 mins shorter), and poorer sleep hygiene (habits and environmental factors that impact sleep). In the word learning task, older adolescents outperformed younger peers at encoding, but underperformed at delayed recall, suggesting age-related improvements in encoding were offset by weaker overnight consolidation. Across groups, better sleep hygiene predicted better encoding and consolidation (β s = 0.10 - 0.56). Closer analysis of sleep hygiene suggested physical activity before bedtime and lack of bedtime routine were particularly strongly associated with poorer memory.

Conclusion: These findings suggest that poor behavioural choices around bedtime contribute to the trade-off between improved encoding capacity and reduced consolidation efficiency in the transition from pre-adolescence to adolescence. This supports theories of word learning that assign a key role for sleep and suggest that interventions targeting modifiable sleep behaviours could strengthen memory formation during this developmental period.

Support (if any):

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0081

EFFECTS OF BLUE-LIGHT BLOCKING GLASSES ON SLEEP AND COGNITION IN COLLEGE STUDENTS WITH POOR SLEEP QUALITYKate Batterson, Jonathan Conrady, Dharmik Namineni, Jane Poinsette, Rachael Rice, Jessica Green, Alexandria Reynolds
University of South Carolina

Introduction: Blue light from evening electronic use suppresses melatonin and disrupts sleep, contributing to cognitive impairments. College students, who frequently use devices before bed, may benefit from amber blue-light-blocking glasses that reduce exposure without changing use patterns. Given known sleep-related deficits in attention, inhibitory control, reaction time (RT), and working memory, this study examines whether evening use of amber glasses can improve sleep and cognitive outcomes in poor-sleeping college students.

Methods: Five (male=3) full-time undergraduate students (mean age=20.2, SD=1.30 years) with poor sleep quality (global screening scores ≥ 5 and/or sleep efficiency $\leq 82\%$ derived from Pittsburgh Sleep Quality Index) completed one week of typical sleep (baseline), then wore amber glasses two hours prior to bedtime for the next two weeks. Wrist actigraphs (Philips Respironics) were worn all three weeks. Participants' accuracy and RTs were assessed using the Sternberg Working Memory Task, Go/No-Go Task, and Psychomotor Vigilance Task (PVT) while electroencephalography (EEG) was recorded at baseline and after the intervention.

Results: Preliminary paired t-tests and repeated measures ANOVAs were conducted. Participants' total sleep time increased after the intervention (Baseline = 394.5 min, Intervention = 449.6 min, $t(3)=-4.398$, $p=.022$). RTs increased with memory load, with faster responses to probes when initial display included 2 compared to 4 [$t(3)=-3.942$, $p=.023$, $d=-0.869$] and 6 [$t(3)=-5.683$, $p=.003$, $d=-1.293$] memory items. Descriptive plots (not significant) showed a trend toward faster RTs after intervention. RTs on Go trials improved after intervention (approaching significance, $t(3)=2.872$, $p=.064$, $d=1.436$). Three of 5 participants experienced fewer lapses on the PVT after intervention. EEG recordings revealed changes in N2 event-related potential (ERP) amplitudes across all three cognitive tasks after intervention.

Conclusion: These initial findings suggest that wearing amber glasses before bedtime may be associated with increased sleep duration and faster response times. Although there is no significant relationship between glasses usage and RT or processing speed with the current sample, the data show a trend of improvements in cognitive measures, which may become statistically significant with more participants. Given the preliminary nature of the current dataset, continued data collection is needed to determine whether these ERP changes reflect amber glasses intervention.

Support (if any): None

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0082

NATURALISTIC SLEEP RESTRICTION AND DOMAIN-SPECIFIC COGNITIVE PERFORMANCE IN YOUNG ADULTSDaphne Valencia, Caroline Chovanes, Andrea Spaeth
Rutgers University

Introduction: Young adulthood is a period in which long-term sleep habits are established, yet many are at increased risk for insufficient sleep. Laboratory research shows that acute and chronic sleep restriction impair vigilance and attention, whereas higher-order cognitive processes remain intact. Less is known about how naturalistic variations in sleep relate to different cognitive domains. This study examined the relationship between sleep duration and architecture and cognitive performance in young adults.

Methods: Healthy young adults enrolled at a large public university ($N=70$, 20.4 ± 1.9 y, 42 female) completed an in-lab cognitive test battery and at-home sleep assessment. The cognitive battery included the psychomotor vigilance test (PVT; vigilance and attention), Digit Symbol Substitution Test (processing speed), N-Back Task (working memory), Motor Praxis Task (sensory motor speed), Visual Object Learning Task (visual learning and spatial working memory), Abstract Matching (abstraction), Line Orientation Task (LOT; spatial orientation), and Balloon Analog Risk Task (BART; risk decision making). Sleep was assessed via wrist-actigraphy, worn for 14 days 24/7, and two nights of at-home polysomnography. Partial Spearman's correlations, controlling for time of test administration, examined associations between sleep and cognitive performance.

Results: In this sample, habitual nocturnal sleep time ranged from 2-9h/night (6.2 ± 1.6). Longer rapid eye movement (REM) sleep duration and higher sleep continuity associated with better performance on the PVT (REM sleep and PVT Lapses: $r=-0.23$, $p=0.05$; sleep efficiency and PVT errors: $r=-0.30$, $p=0.01$; wake after sleep onset and PVT errors: $r=0.30$, $p=0.02$). Higher sleep continuity also associated with less risk-taking on the BART (sleep efficiency and BART pumps: $r=-0.25$, $p=0.04$; wake after sleep onset and BART pumps: $r=0.25$, $p=0.04$). Longer total sleep time ($r=-0.31$, $p=0.009$), REM sleep duration ($r=-0.29$, $p=0.020$) and non-REM stage 2 sleep duration ($r=-0.34$, $p=0.004$) associated with faster reaction times on the LOT.

Conclusion: These findings contribute to growing evidence that vigilance and reaction time are the most sleep-vulnerable cognitive domains. Risk-taking behavior was also sensitive to sleep continuity. In this university-aged cohort, processing speed, working memory, abstraction, verbal learning, and sensory-motor speed appear to remain resilient to naturally occurring variations in sleep.

Support (if any):

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0083

APOE4 EXACERBATES AMYLOID-RELATED SLEEP IMPAIRMENTS

Tri Doan¹, Zhe Liu², Md Joynal Abedin¹, Cynthia Lemere¹, Daniel Laskowitz³, Ksenia Kastanenka¹

¹Mass General Brigham, ²Washington University in St. Louis,

³Duke University

Introduction: Apolipoprotein E $\epsilon 4$ (E4) is the most potent genetic risk factor for Alzheimer's disease (AD), present in up to 60% of AD patients. Concurrently, sleep impairment is a causal contributor to AD pathogenesis, initiating a vicious, bidirectional feedback loop with β -amyloid (A β) pathology that E4 appears to amplify. E4 carriers face elevated risk of amyloid-related imaging abnormalities (ARIA) during A β -clearing therapies, underscoring an urgent need for E4-specific, ARIA-sparing therapeutic strategies. We hypothesized that E4 exacerbates amyloid-induced sleep impairments by synergizing with oligomeric A β species and driving premature circuit dysfunction.

Methods: We crossed APPswe/PS1dE9 (APP) transgenic mice with human APOE knock-in mice, establishing E3/APP and E4/APP experimental lines. Sleep microarchitecture, specifically cortical slow oscillation (SO, < 1 Hz) power and propagation, was assessed using in vivo widefield voltage-sensitive dye (VSD) imaging under anesthesia. Sleep macroarchitecture, specifically sleep stage

duration and fragmentation, was monitored in non-anesthetized, freely-moving mice using wireless, fully implantable EEG/EMG telemetry. The effect of CN-105, an APOE-mimetic peptide, on sleep and SO was examined.

Results: E4/APP mice exhibited profound sleep deficits compared to E3/APP controls at 2 months of age, prior to significant plaque deposition. VSD imaging revealed that E4/APP mice exhibited reduced SO power and impaired intra- and interhemispheric functional connectivity. This 2-month onset is dramatically accelerated, as APP mice lacking human APOE did not show SO impairments until 3 months, and E4-only mice were unimpaired at 2 months. Telemetry recordings showed that 2-month-old E4/APP mice displayed significantly reduced NREM sleep, increased wakefulness, and greater sleep fragmentation compared to E3/APP counterparts. Acute 1.5-day treatment with CN-105 rescued micro- and macroarchitectural deficits, restoring SO power and increasing NREM sleep duration in E4/APP mice.

Conclusion: The E4 genotype functions as an active and reversible driver of sleep impairment, synergizing with oligomeric A β species to accelerate the collapse of sleep-regulating neural circuits. The acute rescue of these deficits with CN-105 demonstrates that this E4-driven circuit dysfunction is an active, ongoing process and not yet a permanent structural failure. These findings validate sleep as an important modifiable risk factor in E4 carriers, offering a promising disease-modifying strategy.

Support (if any): Cure Alzheimer's Fund

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0084

ACUTE HYPERGLYCAEMIA IS ASSOCIATED WITH LOCUS COERULEUS HYPEREXCITABILITY, REM SLEEP DISRUPTION, AND IMPAIRED SPATIAL MEMORY CONSOLIDATION

Prabesh Baniya, Chanyoung Cheong, Euisuk yoon, Tae Kim
Gwangju Institute of Science and Technology

Introduction: Sleep is essential for maintaining metabolic homeostasis. Disruptions in sleep and circadian rhythms adversely affect glucose metabolism and hormonal regulation, thereby promotes the development of metabolic syndrome. In individuals with diabetes mellitus, sleep disturbances are frequently observed and often attributed to secondary complications such as nocturia; however, the common co-occurrence of hyperglycemia and impaired sleep indicates a complex bidirectional relationship. Despite accumulating evidence delineating the interplay between metabolic state and sleep physiology, the mechanistic pathways through which acute hyperglycemia directly influences sleep architecture remain inadequately characterized.

Methods: Acute hyperglycemia was induced in C57BL/6 mice by 8-hour fasting followed by intraperitoneal diazoxide injection and oral glucose gavage, producing ~6 h of elevated blood glucose. EEG/EMG recordings were acquired during this period, with DMSO- and saline-treated mice as controls. For immunohistochemistry, mice ($n = 3/\text{group}$) were sacrificed 3 h after treatment, perfused with PBS and 4% paraformaldehyde, cryoprotected, sectioned (40 μm), and stained with anti-NeuN and anti-c-Fos antibodies. c-Fos⁺/NeuN⁺ neurons were quantified. To monitor locus coeruleus (LC) activity, a TH-Cre mouse received AAV(DJ)-EF1a-DIO-GCaMP6f injection into the right LC and optic fiber implantation 0.15 mm above the site, followed by simultaneous EEG/EMG and fiber photometry.

Results: Acute hyperglycemia markedly suppressed REM sleep, reducing REM percentage, bout length, and duration. EEG absolute power decreased across wake and NREM, indicating dampened cortical activity. Acute hyperglycemia selectively reduced NREM sleep spindle amplitude while leaving spindle density unchanged, suggesting intact initiation but weakened thalamocortical synchrony. LC fiber photometry and c-Fos staining showed increased noradrenergic LC activity during NREM after diazoxide.

Conclusion: Acute hyperglycemia directly suppresses REM sleep, reduces cortical activation, and weakens thalamocortical synchrony, with LC hyperactivity mediating REM inhibition. This study provides the first experimental evidence that a transient elevation in glucose is sufficient to rapidly disrupt REM sleep through LC activation, revealing a metabolic-neuromodulatory mechanism linking hyperglycemia to impaired sleep regulation.

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0085

ASSOCIATIONS BETWEEN LIGHT EXPOSURE AND COGNITIVE PERFORMANCE IN THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

Runpeng Hu¹, Susan Heckbert², Timothy Hughes³, Shaun Purcell¹, Susan Redline¹, Danielle Wallace⁴

¹Brigham and Women's Hospital, ²University of Washington School of Public Health, ³Wake Forest University School of Medicine, ⁴Emory University

Introduction: Mis-timed or suboptimal light exposure patterns can disrupt sleep-wake rhythms and have been linked to adverse health outcomes. Prior work links circadian health to cognitive function, but the direct effect of light on cognition remains unclear. We investigated associations between actigraphy-derived light measures and cognitive performance in a diverse cohort of older adults, hypothesizing that higher daytime light exposure would be associated with better cognition.

Methods: We conducted a cross-sectional analysis using multi-variable linear regression among 1,710 participants (mean age 68.4 years; 54.4% female) with valid wrist actigraphy from the MESA Sleep Ancillary Study and cognitive testing data from MESA Exam 5. White light exposure (lux) was recorded in 30-second epochs by Actiwatch Spectrum devices (Philips Respironics) and log-10 transformed prior to analysis. The primary exposure was average daytime illuminance; secondary exposures included average duration of time in $\geq 1,000$ lux (TALT1000), average nighttime illuminance, and average 24-hour illuminance. "Nighttime" was defined as the 8-hour window centered around each participant's average sleep midpoint, and "daytime" as the remaining 16-hour window. Cognitive performance was assessed using the Digit Symbol Coding (DSC) test. Covariates included sociodemographics, health, lifestyle, and sleep factors, as well as study site, and season.

Results: Daytime light exposure averaged 1.29 (SD 0.44) $\log_{10}$ lux and varied across sites (mean range 1.14–1.39 $\log_{10}$ lux) and seasons, with higher levels in summer. Higher average daytime illuminance was significantly associated with better DSC test scores in the unadjusted model ($\beta = 6.26$; 95% CI: 4.26, 8.27). The association persisted after sequential covariate adjustment (β range 1.92 - 3.12; all $p < 0.05$). Average 24-hour light showed similar associations. Average nighttime light (mean 0.25 $\log_{10}$ lux, SD 0.24) was negatively associated with DSC in the unadjusted

model but with adjustment the association attenuated ($\beta = -3.10$; 95% CI: -6.76, 0.55). TALT1000 was positively associated with DSC in crude models but attenuated to non-significance after adjustment.

Conclusion: Average daytime light was positively associated with cognitive performance, even after adjusting for multiple demographic, health, and sleep variables. These findings support the potential of optimizing daytime light environments to support healthy cognitive aging.

Support (if any):

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0086

BEYOND THE DRM PARADIGM: SLEEP FACILITATES FALSE MEMORIES OF COMPOSITE WORDS

Itamar Lerner

University of Texas at San Antonio

Introduction: Considerable evidence supports the beneficial effects of sleep on memory and learning, including the consolidation and reorganization of memories and the extraction of regularities from encoded experiences. In addition, some studies suggest that sleep may also increase false memories, potentially as a byproduct of regularity extraction. Time-compressed memory replay in the hippocampus during non-rapid-eye-movement (NREM) sleep is thought to support consolidation, yet the functional role of this temporal compression remains unclear. We recently proposed that compressed replay may enable the association of events that occurred at disparate times, thus supporting the extraction of temporal regularities. Consequently, the model predicts that sleep might also facilitate a specific new form of false memory, in which two separate events that occur consecutively are later encoded as a single composite event. The current work investigates this prediction.

Methods: Male and female adults were presented with a series of word pairs (e.g., car, pet) that could form a new composite word when combined (e.g., carpet). Following a retention interval that contained either sleep or wake, they then underwent a surprise memory test for these composite words. EEG was recorded during sleep to examine the contribution of NREM sleep, focusing on slow-wave and spindle-related parameters.

Results: As predicted, participants who slept showed higher rates of false memories for composite words than those who remained awake, indicating that sleep actively facilitated the formation of composite false memories. EEG analyses showed that some slow-wave and spindle-related measures predicted increased false composite memories, whereas other NREM parameters were associated with fewer false memories. The associations with physiological measures were specific for a forward presentation of the words during the initial exposure (car, pet) and were not evident when word components were presented in the backward direction (pet, car).

Conclusion: Our findings support the idea that sleep, and specifically NREM sleep, can promote a distinct class of false memories in which temporally adjacent events are compressed into a single composite representation. The pattern of EEG-behavior relationships partly resembles prior work on non-composite false memories, suggesting a possible competitive interaction between semantic and episodic consolidation processes during sleep.

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Abstract citation ID: zsag091.0087

0087

CHARACTERIZATION OF REM ALPHA AND THETA BURSTS ACTIVITY ACROSS A NIGHT OF SLEEP AND INTRA-INDIVIDUAL RELIABILITYYunke Chen¹, Alessandra Shuster¹, Allison Morehouse¹, Tracy Uzoigwe¹, Temilade Adekoya¹, Jing Zhang², Negin Sattari¹, Fiona Baker³, Katharine Simon¹, Sara Mednick¹¹University of California, Irvine, ²Massachusetts General Hospital/ Harvard Medical School, ³SRI International

Introduction: REM sleep is critical for health and cognitive functioning. Recent studies have identified electrophysiological REM burst events (REM bursts) in theta (4-8Hz) and alpha (8-16Hz) frequency bands associated with cognitive performance, suggesting REM bursts as neural markers of cognitive processes. Still, intra-individual characteristics of REM bursts are unknown. Here, we conducted an in-depth analysis of REM burst events across the night and examined their intra-subject reliability across four nights of sleep.

Methods: 86 healthy young adults (67F; 18-35 years) slept in-lab for four nights with polysomnography. A validated REM burst detection algorithm was used to identify EEG theta and alpha bursts. Using linear mixed models, we examined burst features (count, power, duration, density) across four quartiles of sleep and relations between time in REM and bursts in each night. We also calculated intraclass correlation coefficients (ICCs) for burst features and REM minutes across four nights of sleep per subject.

Results: Both REM theta and alpha burst count increased across each quartile, but burst power decreased over the night. Alpha burst density was lowest during quartile 1 compared with the rest of the night. Theta burst duration increased from quartile 1 and 2 to 3 and 4, while alpha burst duration did not vary. REM minutes positively predicted count and density measures, but negatively predicted power and duration measures. Exclusively in quartiles 1 and 2, REM minutes positively predicted alpha burst density and negatively predicted alpha burst power, indicating potential change in REM physiology from early to late night. Intraclass correlations from alpha and theta bursts showed that power and duration are highly reliable within-subject (ICC≈0.9), while counts, density, and REM minutes are moderately reliable (ICC≈0.5), showing similar levels of reliability levels as non-REM sleep spindles.

Conclusion: REM bursts were shorter, higher in power, and negatively correlated with the amount of REM sleep in the first half of night, while density increased across the night. We also identified burst features as trait-like, with intra-individual reliability comparable to existing spindles results. These results may provide foundational knowledge for studying REM bursts as neural markers of REM functions.

Support (if any): RF1AG061355 (Baker/Mednick). K08HD107161 (Simon).

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0088

COGNITIVE COLLAPSE: HOW OSA TARGETS EXECUTIVE FUNCTION AND MEMORY, VALIDATED IN LOW-EDUCATION COHORTSPaula Alana Morais Seixas¹, Nathalia Lemos¹, Gabriela Brito¹, Laís Mota², Lorenzo Cirri³, Cristina Salles²

¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Royal Brompton Hospital, Guy's and St. Thomas NHS Foundation Trust

Introduction: Introduction: Evidence suggests that patients with Obstructive Sleep Apnea (OSA) have an increased risk of cognitive impairment, which is primarily attributed to intermittent hypoxia. The Montreal Cognitive Assessment Basic (MoCA-B) is a tool used to evaluate cognitive impairment in populations with low educational attainment. Objective: To evaluate cognitive function by MoCA-B domain in patients with OSA.

Methods: Methods: This was a cross-sectional study nested within a cohort, evaluating 36 individuals, 58.1% of whom were women, with a mean age of 53.95 ± 11.86 years. Patients diagnosed with OSA were included, and the following measures were collected: age, Body Mass Index (BMI), sex, and ethnicity. The MoCA-B was administered for cognitive assessment.

Results: Results: The sample showed a predominance of 'pardo' (mixed-race) individuals, comprising 18 patients (41.9%). Mean BMI was 30.77 ± 8.06. The mean total score on the MoCA-B was 23.64 ± 3.78, and 64.3% of the participants scored below 26 points. Breaking down the results, Executive Functions = 0.43 ± 0.50, with 27.9% correctly completing the alternating trails test. Immediate Recall was not scored, following the MoCA-B protocol. Fluency = 1.45 ± 0.63, with 34.9% naming 13 fruits or more. Orientation = 5.72 ± 0.79, with 55.8% achieving the maximum score of 6 points. Calculation = 2.76 ± 0.95, and 48.8% were able to give change in three different ways. Abstraction = 1.83 ± 1.00, with 18.6% correctly identifying the corresponding category. Delayed Recall = 2.48 ± 1.47, and only 9.3% achieved free recall of all five words. Visual Perception = 2.66 ± 0.61, with 48.8% naming nine to ten objects. Naming = 3.55 ± 0.82, and 48.8% named all the animals. For Attention, the activity involving numbers in circles = 0.97 ± 0.49, with 58.1% committing none or only one error. The naming of numbers in circles and squares presented a mean score of 1.91 ± 0.30, and 23.3% made two errors or less.

Conclusion: Conclusion: Thus, a high proportion of the analyzed patients exhibited cognitive impairment as determined by the MoCA-B, with the domains showing the poorest performance being: Executive Function, Verbal Fluency, Abstraction, and Delayed Recall.

Support (if any): None

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0089

INFLUENCE OF REM SLEEP ON WORKING MEMORY PRECISION AND CAPACITYTemilade Adekoya¹, Allison Morehouse¹, Tianye Ma², Weiwei Zhang², Sara Mednick¹¹University of California, Irvine, ²University of California, Riverside

Introduction: The rigidity or fluidity of working memory (WM) capacity has been debated, with some studies suggesting that capacity is strictly limited by the number of to-be-remembered objects. While others indicate that prioritizing certain items in a memory array (and therefore creating more precise representations) can influence the number of items we are able to store. This creates a tradeoff between memory precision and capacity. Sleep, specifically NREM, has been shown to enhance WM using

complex sequences or updating tasks (e.g. OSPAN, n-back). However, no studies have examined whether sleep plays a role in the trade-off between capacity and precision. This study bridges this gap by examining how a nap versus wake affects WM capacity and precision measured from a continuous color recall task.

Methods: 64 healthy adults (18-35 yrs) completed a WM continuous recall task before and after a period of rest. Participants were randomized into three rest groups: a 60-minute NREM nap with polysomnography (PSG), a 90-minute NREM+REM nap with PSG, and an unmonitored active wake period. Using linear models (LMs), we predicted post-sleep WM capacity and precision, with rest group and sleep architecture (total sleep time (TST) and total time spent in NREM and REM) as predictors.

Results: The NREM+REM group had moderately higher post-nap improvement in precision than the NREM group. There were no significant differences in precision changes between the AW group and either nap group, and no differences in capacity between sessions across the three groups. Time in REM, but not NREM, correlated with precision improvement. Finally, we found that increased REM sleep moderately predicted a tradeoff between improvement in precision over capacity (i.e. capacity change - precision change).

Conclusion: Our results show that while WM capacity does not improve with a nap, precision is influenced by sleep. We specifically found that REM sleep supports WM precision improvement and the trend toward precision improvement over capacity improvement. Our results provide preliminary evidence supporting a relation between sleep and WM capacity and precision.

Support (if any): University of California - Irvine Internal Grant

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0090

SLEEP CONTRIBUTES TO THE NEGATIVE MEMORY BIAS IN INDIVIDUALS WITH HIGH DEPRESSIVE SYMPTOMS

Ashlynn Friudenberg, Sampada Niroula, Regan Christian, Carmen Westenberg
Texas State University

Introduction: Depressed individuals typically exhibit superior memory for negative compared with neutral and positive information. During sleep, memory consolidation processes stabilize and strengthen recent memories for long-term storage. In keeping with theories suggesting that goal-consistent memories are preferentially consolidated over other memories during sleep, we hypothesized that sleep-dependent memory consolidation may contribute to this memory bias through the selective strengthening of negative memories over other memories in depressed individuals.

Methods: Potential participants were screened with the Beck Depression Inventory (BDI) and individuals with high depressive symptomology were invited to participate. All participants listened to a story with happy, sad, and neutral details and then took a 90-min break. During the break, half of each group (high or low depressive symptoms) took a nap monitored with polysomnography ($n = 31$). The other halves of each group remained awake ($n = 36$). After the break, all participants took a free recall test for details from the story heard before the break.

Results: For participants who slept during the break, there were no differences in time spent asleep, time spent in different sleep stages, slow-oscillatory power, or sleep spindle activity between

high and low depressive participants. However, participants with high depressive symptoms recalled a higher proportion of sad details and a smaller proportion of happy details than participants with low depressive symptoms. For participants who remained awake during the break, there were no differences in the proportion of happy or sad details recalled between high and low groups.

Conclusion: A negative memory bias in individuals with high depressive symptoms was only present for participants with high depressive symptoms who slept during the break, indicating that sleep-dependent memory consolidation contributes to the negative memory bias in individuals with high depressive symptoms. Future treatments aimed at prioritizing positive and/or neutral memories for sleep-dependent memory consolidation may help to ameliorate the negative memory bias in depressed individuals.

Support (if any):

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0091

SLEEP, COGNITIVE CONTROL, AND EXTERNALIZING: DIVERGENT PATHWAYS TO ANGER AND IMPULSIVITY

Rebecca Griffith, Lauren Keller, Simey Chan, Prachi Shah, Adriane Soehner
University of Pittsburgh

Introduction: Cognitive control is a core regulatory process implicated in externalizing behaviors (e.g., anger, impulsivity), and it is typically measured by average accuracy. Less work has examined trial-to-trial variability, which may capture instability in control processes. Sleep is another key regulator of affect and behavior, yet its role in shaping links between cognitive control and externalizing behavior is not well understood. We tested whether cognitive control variability (CCV) and accuracy predicted two facets of externalizing behavior, anger and impulsivity, and whether sleep duration and efficiency moderated these associations.

Methods: Participants ($N = 120$; baseline, $N = 89$; 6-month; $\text{Mage} = 21.7$) were recruited across a spectrum of mental health symptoms. They completed two weeks of sleep monitoring via daily diary and actigraphy. Cognitive control was assessed with the Multi-Source Interference Task, from which two indices were derived: trial-to-trial variability in reaction time (CCV) and mean accuracy. Anger (past 7 days) and impulsivity (negative urgency) were assessed with self-report scales. Analyses tested whether sleep duration and efficiency moderated associations between CCV/accuracy and anger/impulsivity, covarying age, sex, mental health symptoms, and mean reaction time.

Results: For anger, higher CCV predicted greater symptoms, particularly when diary-based sleep duration was shorter ($\beta = -0.08$, $p = .02$). By 6 months, moderation effects diminished, but CCV continued to show direct associations with anger. For impulsivity, accuracy, not CCV, was the primary predictor. At baseline, actigraphy-based sleep efficiency moderated this link, such that higher efficiency increased the protective effect of accuracy ($\beta = 1.15$, $p = .01$). By 6 months, higher accuracy predicted lower impulsivity across sleep indices. Sleep duration and efficiency showed no independent main effects.

Conclusion: Different aspects of cognitive control mapped onto distinct facets of externalizing. Variability in control signaled risk for anger, especially under shorter sleep, consistent with anger as a proximal, state-like outcome sensitive to short-term sleep

and moment-to-moment instability. Accuracy was most relevant for impulsivity, aligning with impulsivity as a more trait-like disposition that is less tied to immediate sleep but is predicted by accuracy over time. Variability and accuracy thus index distinct pathways to externalizing, with sleep shaping how those pathways are expressed.

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0092

SUBJECTIVE INSOMNIA, BUT NOT OBJECTIVE SHORT SLEEP DURATION, IS ASSOCIATED WITH IMPAIRED SLEEP-DEPENDENT PROCEDURAL MEMORY CONSOLIDATION

Olivia Larson, Noah Love, Ruda Lee, Holly Barilla, Arjun Sengupta, Matthew Kayser, Aalim Weljie, Philip Gehrman
University of Pennsylvania

Introduction: Sleep enhances procedural and declarative memory consolidation in healthy adults, but individuals with insomnia exhibit deficits in sleep-dependent memory processes. The mechanisms underlying these deficits are unclear. While subjective complaints define insomnia, some individuals also experience objectively short sleep (< 6 h/night). Here, we aimed to disentangle the effects of subjective insomnia and objective short sleep on overnight memory consolidation.

Methods: Thirty-eight participants were recruited into four groups: insomnia with short sleep (n=5), insomnia with normal sleep (n=13), short sleepers without insomnia (n=4), and good sleepers (n=16). Group classification was based on clinical interview and at-home actigraphy. Participants completed a four-day inpatient protocol that included training and immediate testing on the procedural Motor Sequence Task (MST) and declarative Word Pairs Task (WPT). Delayed retesting occurred after either a night of habitual-length sleep (monitored via polysomnography [PSG]) or an equivalent period of wakefulness. Linear mixed-effects models examined the interaction of condition (Sleep vs Wake), insomnia status, and habitual short sleep on percent change in performance from testing to retesting. Follow-up analyses evaluated potential moderation by PSG parameters.

Results: The three-way interaction among insomnia, short sleep, and sleep/wake condition did not predict changes in MST or WPT performance. However, a significant interaction between insomnia status and condition emerged for the MST ($p=0.02$), such that only participants without insomnia benefitted from sleep (Sleep–Wake=8.36% change; $p=0.04$) whereas participants with insomnia did not (Sleep–Wake=-5.20% change; $p=0.22$). On the WPT, no interaction was observed, but a significant main effect of condition indicated that all participants benefitted from sleep relative to wake (Sleep–Wake=6.32% change, $p=0.03$). No PSG parameters, including total sleep time, significantly moderated these effects.

Conclusion: Here, only individuals without subjective sleep complaints benefitted from a sleep-dependent boost in procedural memory, but all participants benefitted in the declarative memory domain. Habitual sleep duration did not significantly influence outcomes, although there was a limited sample size for short sleepers. Future analyses will explore whether particular EEG features, such as cortical hyperarousal and spindles, mediate relationships between insomnia and performance.

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0093

SUPERIOR SLEEP IN HIGHLY SUPERIOR AUTOBIOGRAPHICAL MEMORY

Carmen Westerberg¹, Logan Trujillo¹, Susan Florczak², Ken Paller², Ashlynn Friudenberg¹

¹Texas State University, ²Northwestern University

Introduction: Individuals with highly superior autobiographical memory (HSAM) have the rare ability to instantly recall nearly every day of their adult lives. Previous research indicates that the extraordinary abilities of HSAM individuals are not a result of better memory encoding. Rather, HSAM individuals appear to not forget as easily as other individuals. One possibility is that enhanced memory consolidation during sleep may allow for stronger autobiographical memories that are more resistant to forgetting in HSAM individuals. Thus, aspects of sleep previously implicated in memory consolidation, including slow-oscillatory activity, sleep spindles, and synchrony between slow-oscillations and sleep spindles during non-REM sleep, may be enhanced in HSAM.

Methods: Overnight polysomnography was measured for two nights in HSAM individuals ($n = 9$) and in controls ($n = 13$) matched in age, sex, race, and education level to the HSAM individuals. The first night served as an adaptation night. All participants also completed brief neuropsychological assessments of episodic memory and intelligence and subjective measures of sleep and daytime sleepiness.

Results: No group differences were observed in the neuropsychological assessments or in the subjective measures of sleep and daytime sleepiness. Likewise, there were no group differences in total sleep time, time spent in each sleep stage, or in frontal non-REM slow-oscillatory power (.5 – 1.5 Hz). However, HSAM individuals showed higher non-REM sleep spindle density than controls at frontal, central, and parietal sites, with the largest increase at parietal sites. Furthermore, during non-REM sleep, spindles were more precisely coupled to the peaks of the slow oscillations in HSAM individuals than in controls at parietal sites.

Conclusion: These results are the first to demonstrate that aspects of sleep physiology previously implicated in memory consolidation, including sleep spindles and coupling between sleep spindles and slow oscillations, are enhanced in individuals with HSAM. This suggests that superior memory consolidation contributes to superior autobiographical memory in HSAM and increases our understanding of this fascinating condition, laying the groundwork for future studies aimed at leveraging sleep/memory connections for improving memory.

Support (if any): McKnight Endowment Fund for Neuroscience

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0094

THE ROLE OF THE THALAMIC RETICULAR NUCLEUS CONNEXIN36 IN SLEEP-WAKEFULNESS AND TASK-EVOKED EEG ACTIVITY

Sean Carey¹, Victoria Lombardi², David Uygun¹, James McNally¹, Radhika Basheer¹

¹VA Boston Healthcare System, ²Boston VA Research Institute

Introduction: Neuronal gap junction protein connexin36 (Cx36) forms electrical synapses. They are widely expressed in the mammalian forebrain and are suggested to play a significant role in state regulation and thalamocortical network activity. Cx36 is expressed in GABAergic neurons in the adult brain and is responsible for the electrical coupling between inhibitory neurons. Specifically, the intercellular communications between GABAergic neurons in the thalamic reticular nucleus (TRN) occur predominantly via Cx36-containing electrical synapses. We have examined the effect of TRN-specific localized CRISPR-Cas-mediated Cx36 gene knockdown (KD) on sleep/wake, spontaneous, and evoked EEG activity.

Methods: We examined the sleep/wake pattern, spontaneous and task-evoked EEG activity during auditory steady-state response (ASSR), and social interaction behavioral test in PV-Cre-Cas9 mice before and after TRN-PV neuron-selective Cx36 gene KD.

Results: Cx36KO mice exhibited limited sleep/wake abnormalities. Cx36KD mice exhibited an impaired 40 Hz ASSR, and significant impairment in social investigation-induced low-frequency gamma band activity. Preliminary results from localized CRISPR KD of TRN-Cx36 KD (N=5 mice) showed a trending 30.67% reduction in evoked cortical gamma power during ASSR when compared to the pre-AAV-injection condition in the same mice. Preliminary observations (N=2 mice) in our social investigation task the gamma power showed a trending attenuation (-9.21%), in post-injection Cx36KD condition compared to baseline, suggesting a modulatory effect of TRN Cx36 KD on task-evoked cortical gamma activity.

Conclusion: Our data suggest that Cx36 in TRN is involved in regulating oscillatory activity in the thalamocortical network. These observations are the first to suggest that TRN Cx36 KD causes impairments in task-evoked cortical gamma activity that are consistent with abnormalities observed in neuropsychiatric disorders, including schizophrenia, suggesting Cx36 as a novel therapeutic target.

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0095

FMRI DECODING DURING SLEEP REVEALS CONTRIBUTIONS OF NREM REACTIVATION TO THE SPECIFICITY OF LEARNING

Theodore LaBonte-Clark, Teruaki Kido, Takeo Watanabe, Yuka Sasaki
Brown University

Introduction: Learning in a variety of tasks is known to be enhanced by post-training sleep, but the underlying neural mechanisms remain unclear. One leading hypothesis is that the re-emergence of training-related neural activity during sleep, known as reactivation, is essential for sleep-dependent learning. According to this hypothesis, task improvement should reflect reactivated representations, and learning should not generalize to representations that are not reactivated. Here, we tested a novel model proposing that the specificity of neural reactivation reflects the specificity of learning.

Methods: In the experiment, participants were trained to detect a Gabor patch with a single orientation. During a post-training nap session, we recorded fMRI activity from early visual areas simultaneously with polysomnography to determine sleep stages.

We applied a previously constructed fMRI decoder capable of classifying four Gabor orientations, including the trained orientation, to the fMRI data collected during sleep

Results: In the event that learning occurred, the decoder classified the neural activity observed during NREM sleep as similar to the trained orientation above chance, suggesting selective reactivation of the trained orientation during sleep. Furthermore, higher levels of classification of the trained orientation appeared to accompany greater performance improvement after sleep for the trained orientation only.

Conclusion: This pattern suggests that neural reactivation in visual cortex during NREM sleep reflects the trained stimuli, and it supports the proposal that reactivation plays a key role in mediating the specificity of learning.

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0096

LONGITUDINAL REST-ACTIVITY RHYTHMS ARE ASSOCIATED WITH COGNITIVE TRAJECTORIES AND CLINICAL OUTCOMES IN OLDER ADULTS

Daniel Callow¹, Adam Spira², Abhay Moghekar¹, Sarah Wanigatunga², Corinne Pettigrew¹, Marilyn Albert¹, Anja Soldan¹, Arnold Bakker¹

¹Johns Hopkins University School of Medicine, ²Johns Hopkins Bloomberg School of Public Health

Introduction: Altered circadian rhythms have been implicated in cognitive health, and 24-hour actigraphic rest-activity rhythms (RARs) are commonly used as estimates of circadian rhythmicity. Prior work has mostly examined only baseline RARs, so it remains uncertain whether mean RAR parameters or their changes over time are associated with cognitive trajectories or incident mild cognitive impairment (MCI).

Methods: We studied 169 cognitively unimpaired adults (71.1 ± 8.7 years) in the BIOCARD study with wrist-actigraphy data; 137 completed 2–4 follow-up visits over 2–8 years. RAR metrics included relative amplitude (RA; day–night activity contrast), interdaily stability (IS; day-to-day regularity), and intradaily variability (IV; within-day fragmentation). Each metric was decomposed into between-person mean levels (reflecting participants' average RAR across visits) and time-varying changes (capturing visit-to-visit deviations from each participant's mean). Linear mixed-effects models examined associations of both mean levels and time-varying changes with longitudinal executive function, adjusting for age, sex, education, APOE-ε4 status, vascular risk, valid actigraphy days, and time since baseline, with random intercepts for participants. Exploratory Cox proportional hazards models assessed associations with time to incident MCI (n=12), incorporating both mean parameters and time-varying changes.

Results: Participants with higher mean RA, greater IS, and lower IV across follow-up had better executive function (RA B = 0.102, p < 0.001; IS B = 0.079, p = 0.014; IV B = -0.067, p = 0.035). Time-varying reductions in RA and increases in IV were associated with concurrent decrements in executive function (RA B = 0.023, p = 0.004; IV B = -0.019, p = 0.026). In the exploratory Cox model, higher mean RA was associated with lower MCI risk (HR = 0.499, p = 0.004), whereas time-varying changes in RA, IS, or IV were not significantly associated with MCI.

Conclusion: Both mean and time-varying changes in RAR parameters were associated with executive function, with stronger, more

regular, and less fragmented rhythms linked to better performance. Higher mean RA was also associated with lower MCI risk. These findings highlight RARs as markers of or contributors to cognitive health and suggest that longitudinal monitoring can provide insight into cognitive resilience in older adults.

Support (if any):

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0097

AN INVESTIGATION OF THE RELATION BETWEEN OBJECTIVE AND SUBJECTIVE SLEEP AND PROCESSING SPEED SUBDOMAINS IN NEUROTYPICAL YOUTH

Emmet Klein¹, Chelsea Cadle¹, Gabrielle Deutsch¹, Ahna Pai¹, Gerry Taylor¹, Maninder Kalra², Paola Malerba¹

¹Center for Biobehavioral Health, Nationwide Children's Hospital, ²Nationwide Children's Hospital

Introduction: The relation between sleep and processing speed in youth is not fully understood. Measures of sleep health and polysomnography (PSG) may assess complementary sleep properties that have different associations with cognition. To better understand how objective and self-reported sleep relate to subdomains of processing speed in typically developing youth, we investigated associations of objective and subjective sleep measures with tests of cognitive speed and reaction time.

Methods: Sixty-one participants completed all study measures (Avg. Age=13 ± 3.2 years, 36 females) including one overnight PSG, cognitive measures including the Processing Speed Index (PSI; from Wechsler Intelligence Scale for Children/Wechsler Adult Intelligence Scale) and the Psychomotor Vigilance Test (PVT), and a seven-day sleep diary. From sleep diaries, we measure self-reported time in bed (dTIB, minutes) and wake after sleep onset as a measure of sleep disturbance (dWASO, minutes). From PSG, we record objective sleep duration (psgDuration, minutes) and wake after sleep onset (psgWASO, minutes). We compare objective and subjective sleep measures with PSI and PVT using Pearson correlations. We analyze the influence of age as covariate using partial correlations. Significance was defined by p-values <.05.

Results: PSI scores were positively correlated with both dWASO ($r=.27$, $p=.04$, small effect) and psgWASO ($r=.31$, $p=.02$, small effect), but not with psgDuration ($p=.21$) or dTIB ($p=.63$). When accounting for age, PSI remained correlated with psgWASO ($r=.28$, $p=.03$, small effect), but not dWASO ($r=.24$, $p=.07$). PVT was positively correlated with dTIB ($r=.45$, $p<.01$, moderate effect), although when accounting for age, this correlation did not remain significant ($r=.06$, $p=.64$).

Conclusion: Cognitive speed related to objective and subjective measures of sleep disturbances, but not TIB or sleep duration. In contrast, reaction time was associated only with self-reported TIB. The counterintuitive positive relation between sleep disturbances and cognitive speed could be related to the trait-like nature of the cognitive speed measure we used and is worth examining further. Overall, our findings highlight the importance of leveraging in-lab and at-home sleep measures when investigating the relationship between sleep and cognition.

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0098

IMPROVING SLEEP-DEPENDENT MEMORY IN INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT VIA A TAILORED LIGHTING INTERVENTION

Alessandra Shuster¹, Weixin Li², Sara Mednick¹, Mariana Figueiro²

¹University of California, Irvine, ²Icahn School of Medicine at Mount Sinai

Introduction: Tailored Lighting Interventions (TLI) that target the circadian system can improve sleep in individuals with mild cognitive impairment (MCI). Yet, whether these sleep benefits translate to improved cognitive function is not known. To address this gap, we examined how at-home TLI impacted longitudinal trajectories of sleep-dependent episodic and working memory in older adults with MCI.

Methods: We conducted a randomized, placebo-controlled, longitudinal at-home TLI trial in adults with MCI. Participants ($n=61$; 69.7 ± 8.0 years; 29F) were randomly assigned to the active TLI or placebo condition, with all participants completing four at-home visits at weeks 1 (baseline), 13, 25, and 37 (follow-up). At each visit, participants completed episodic and working memory tasks before and after a full night of sleep at-home monitored by actigraphy. Episodic memory was assessed via the Word Pair Association task, while working memory was assessed via the operation span (OSPAN) task. Sleep-dependent memory for each task was defined as the over-night change in performance. Linear mixed effects models evaluated main and interaction effects of group (TLI vs. placebo) and time (visit) on sleep-dependent memory. Significant interaction effects were further examined using post-hoc t-tests.

Results: The TLI group showed significantly greater sleep-dependent memory at the follow-up visit compared with placebo ($p < .05$). For both tasks, mixed linear models yielded a significant interaction of visit x group (WPA: $p = .02$, $t = -2.33$; OSPAN: $p = .03$, $t = -2.19$), with post-hoc t-tests identifying significant differences between groups at visit 4, with greater sleep-dependent memory in the TLI group (WPA: $p = .003$, $t = 3.16$; OSPAN: $p = .04$, $t = 2.17$). No significant main effects of visit or group were observed ($p > .05$), suggesting that the TLI specifically contributed to long-term benefits in sleep-dependent memory.

Conclusion: Our findings demonstrate that circadian entrainment can be done at-home to improve sleep-dependent memory in individuals with MCI. This approach holds translational relevance for developing accessible, sleep-focused, at-home strategies to mitigate age-related cognitive decline.

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0099

NAPPING AFTER LEARNING BOOSTS LONG-TERM AMBULATORY VR SPATIAL NAVIGATION THROUGH SLEEP SPINDLES

Allison Morehouse, Temilade Adekoya, Yunke Chen, Tracy Uzoigwe, Katharine Simon, Elizabeth Chrastil, Sara Mednick

University of California, Irvine

Introduction: Spatial navigation is a complex behavior requiring the integration of memory, perception, attention, motor movement, and decision making, and relies on the hippocampus. Since NREM sleep supports hippocampal-dependent memory, NREM may also benefit navigation. Yet prior findings are mixed, likely due to heavy reliance on stationary, two-dimensional desktop tasks. Additionally, many studies lack EEG data to examine the role of sleep electrophysiology, e.g. sleep spindles (12-15Hz), in navigation. To address this gap and the lack of immersive tasks mirroring human navigation, we systematically investigated sleep's contribution to spatial navigation using a nap paradigm and an immersive, ambulatory virtual reality (VR) task.

Methods: 60 healthy young adults (18-35y, mean 22.55; 17 wake, 43 nap) completed an ambulatory VR spatial navigation task where participants freely explored a maze to locate and remember 12 object locations. They were tested three times: immediately after encoding (Test 1), at the end of the experimental day (Test 2), and at the follow-up visit (Test 3; 2-3 days later). Between Tests 1 and 2, participants either took an EEG-monitored nap or remained quietly awake, and spindles were detected. Navigation efficiency improvement (i.e. change in proportion of actual to optimal path length) was analyzed using two linear models with sex, age, and group (nap vs. wake; model1) or sleep spindles and total sleep time (model2) as predictors.

Results: Although there were not group differences directly after a nap, participants who napped right after learning showed greater benefits at the 48–72-hour follow-up. Within the nap group, spindle density (N3) significantly predicted greater improvements in navigation efficiency from Test 2 to 3. Sex and age were not significant predictors in either analysis.

Conclusion: Using an ambulatory VR navigation task, we found that sleep benefits spatial navigation, with a nap immediately after learning improving navigation efficiency after 48 hours. Navigation efficiency reflects consolidation of a cognitive map, i.e., a mental representation of the environment, and was enhanced specifically through sleep spindles, suggesting that spindles facilitate shortcuts and novel routes to remembered target locations. Future studies should examine how spindles modulate hippocampal engagement during the development of cognitive map representations.

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0100

SENSORIMOTOR PROCESSES/LEARNING MEMORY AND WEIGHT GAIN IN THE C57BL/6J MOUSE: EFFECTS OF APOLIPOPROTEIN A2 EXPRESSION

Kingman Strohl¹, Hiroyuki Arakawa²

¹University Hospitals Cleveland Medical Center, ²Department of Pharmacology, University of Michigan Medical School

Introduction: Apolipoprotein A2 (ApoA2) is a subclass of lipoproteins carrying cholesterol and triglycerides through the bloodstream. In the mouse ApoA2 expression is deterministic for ventilatory instability (Gillombardo et al 2018). There are known genetic effects on lipid levels and weight identified in humans. A role in cognition and feeding is not defined, especially compared to other lipoproteins

Methods: Using the C57BL/6J (B6) mouse model (WT) in which ApoA2 expression is deterministic for breathing instability awake,

anesthetized, and asleep, we compared the ApoA2 knockout on a B6 background (KO) mice to the WT for sensorimotor/learning skills, and for weight gain over 20 weeks (high fat vs. low fat diet).

Results: ApoA2 KO mice displayed increased timidity in T-maze exploration and heightened freezing in non-contextual defensive conditions. In the fear conditioning test, twenty-four hours following the training, a higher freezing time was shown in KO mice when exposed to non-associated context ($p = 0.0005$) but no difference between genotype when exposed to conditioned cue as a cue-dependent fear ($p = 0.61$); the differences were not ascribed to learning deficit. No significant genotype differences were observed in sensory, emotional, or learning tasks, including tactile and coordinative assessments, anxiety-like behavior, locomotor activity, Y-maze alternation, novel object recognition, and fear conditioning with extinction. At ages of 20 weeks, mice fed with low-fat diet showed similar body weights, whereas WT mice fed with high-fat diet exhibited a greater body weights than KO mice fed with high-fat diet or WT mice fed with low-fat diet ($p < 0.0001$) [genotype: $F(1,36) = 54.86$, $p < 0.0001$, diet: $F(1,36) = 92.15$, $p < 0.0001$, and interaction: $F(1,36) = 47.16$, $p < 0.0001$].

Conclusion: ApoA2 expression contributes to defensive behavioral expression and enhanced weight gain on high fat nutrients, highlighting its potential role in allostatic mechanisms operating to produce obstructive sleep apnea

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0101

EFFECT OF ANTI-SEIZURE MEDICATION ON SPINDLE–SLOW OSCILLATION COUPLING IN CHILDHOOD ABSENCE EPILEPSY: A LONGITUDINAL ANALYSIS

Seung Soo Kim¹, Hyewon Woo², Eun Kyeong Kang³, Jin-Hwa Moon⁴

¹Department of Pediatrics, Soonchunhyang University Cheonan Hospital, ²Department of Pediatrics, Chungbuk National University Hospital, ³The Catholic University of Korea, Eunpyeong St. Mary's Hospital, ⁴Department of Pediatrics, Hanyang University College of Medicine

Introduction: Spindle–slow oscillation (SP–SO) coupling supports memory via hippocampal–cortical communication. Childhood absence epilepsy (CAE), with 3-Hz spike-and-wave (SSW) discharges reflecting abnormal thalamocortical oscillations, is associated with cognitive deficits. Anti-seizure medications (ASM) may also alter SP–SO coupling; thus, evaluating ASM effects while adjusting for SSW is important. This study examined ASM's impact on SP–SO coupling in children with CAE.

Methods: Authors retrospectively reviewed the medical records of patients who were diagnosed with CAE at one university hospital. Average montage sleep EEGs were analyzed using only stage N2. We calculated the z score for magnitude of SP–SO coupling (COUPL_MAG_Z) based on surrogate time series for 13Hz sleep spindle (SP) on C3 and 11Hz SP on F3 using the lunapi (<https://zzz.bwh.harvard.edu/lunapi/>). The generalized estimating equations (GEE) were then applied to evaluate the effects of ASM while adjusting for SSW, and conversely, to evaluate the effects of SSW while adjusting for ASM.

Results: This study enrolled 14 patients for the analysis. The positive SSW group had 11 subjects (mean age 8.3 ± 2.2 year-old) in the negative SSW group had 3 patients (mean age 7.9 ± 0.5 year old).

A total of 7 patient was treated with ASM and most common ASM was lamotrigine. On GEE, ASM was associated with a significant increase in 11 Hz SP density on F3 ($P < 0.01$) after adjusting for SSW. Conversely, after adjusting for ASM, the negative SSW group exhibited higher 13 Hz SP density on C3 compared to the positive SSW group ($P < 0.01$). Additionally, after controlling for SSW, ASM was found to significantly reduce COUPL_MAG_Z at 11 Hz on F3 ($P = 0.02$) and at 13 Hz on C3 ($P < 0.01$).

Conclusion: Even after adjusting for SSW, ASM was associated with reduced slow SP-SO coupling in the frontal region and reduced fast SP-SO coupling in the central region. Prospective multimodal studies are needed to clarify the relationship between these biomarkers and cognitive function.

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0102

DOES TARGETED MEMORY REACTIVATION DURING SLOW WAVE SLEEP ENHANCE EMOTIONAL MEMORY IN YOUNG ADULTS

Katrina Rodheim, Anna Betz, Siddhi Sharma, Rebecca Spencer
University of Massachusetts Amherst

Introduction: Sleep enhances negative emotional memory consolidation in young adults. Targeted memory reactivation (TMR) is thought to increase memory recall for cued items by cuing stimuli with sensory cues during encoding and replaying target cues during sleep. Exposure to TMR during periods of slow wave sleep (SWS) improves declarative and procedural memories. The present study examined whether TMR via olfactory cues during SWS also enhances negative emotional memory consolidation in young adults.

Methods: Healthy young adults (mean age = 19.78 ± 1.86 years) completed either experiment 1 (Negative and neutral pictures intermixed; $N=24$) or experiment 2 (Negative and neutral pictures in separate blocks; $N=48$). Participants learned 36 picture-location pairs, half associated with odor A and the other half associated with odor B and the cued odor was administered during subsequent SWS. Delayed recall occurred after sleep, with no odors or feedback. Polysomnography was recorded and an olfactometer was used to deliver odor cues.

Results: In experiment 1, TMR enhanced memory for neutral ($p=0.03$), but not negative stimuli. In experiment 2, TMR had no effect on either negative or neutral stimuli. In experiment 2, poorer initial encoding was associated with a greater cuing benefit, but only for neutral stimuli ($p=0.02$) and the same relationship was trending towards significance in experiment 1 ($p=0.07$). In experiment 1, N2 duration was marginally associated with cued neutral memory performance ($p=0.06$). In experiment 2, cued neutral memory performance was not associated with any sleep stage.

Conclusion: TMR did not enhance negative memory consolidation in young adults. However, TMR selectively benefitted neutral memories when emotional and neutral stimuli were intermixed. These findings suggest that TMR may preferentially enhance neutral declarative memories when intermixed with negative items and that encoding strength across both experiments modulates

its effectiveness. Future analysis will examine sleep microstructures such as spindles, which are a hallmark of N2, to understand potential mechanisms underlying TMR benefits.

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0103

AGE-RELATED CHANGES IN EMOTIONAL MEMORY AND PROCESSING DEPEND ON SLOW-WAVE AND REM SLEEP MICROSTRUCTURE

Xinran Niu¹, Ryan Monkman², Kristin Sanders¹,
Elizabeth Kensinger³, Jessica Payne¹

¹University of Notre Dame, ²University of Oregon, ³Boston College

Introduction: Aging is characterized by reduced slow-wave sleep (SWS) and relatively preserved Rapid Eye Movement (REM) sleep, but most prior research focus on the duration of these stages rather than their microstructural neurophysiological features. Although older adults typically remember positive information better and negative information less well, studies of sleep-based memory consolidation in aging have largely examined emotionally neutral material. The present study tested how slow-wave and REM microstructure change in aging, and whether age-related differences in emotional memory are moderated by specific microstructural features of SWS and REM sleep.

Methods: Fifty-nine healthy adults (ages 18-65) encoded scenes containing negative (e.g., a vicious-looking snake), positive (e.g., a cute kitten), or neutral objects (e.g., a chipmunk) superimposed on neutral backgrounds (e.g., an avenue). Post-encoding sleep was recorded using at-home polysomnography. The following morning, participants completed an old/new recognition task for each object and background. Finally, they viewed all encoding scenes again and rated their valence.

Results: Advancing age was associated with fewer (reduced count and density), weaker (lower amplitude), and shallower (less steep slope) slow waves during SWS. In contrast, REM amplitude and slope during REM sleep increased with age. Negative memory trade-offs (i.e., better memory for negative objects at the expense of paired neutral backgrounds) declined with age, but only when slow-wave counts were low. However, age was not correspondingly associated with increased positive memory trade-offs. Instead, older age was linked to perceiving all scenes more positively among individuals with more frequent slow waves, stronger slow waves, or steeper REMs.

Conclusion: Age-related changes in sleep microstructure are stage specific, with slow waves showing broad declines and REM events exhibiting selective increases in amplitude and slope. These patterns potentially reflect reduced homeostatic sleep regulation in late adulthood, which weakens slow-wave dynamics, while heightened REM activity may serve as a compensatory mechanism. Under conditions of reduced slow-wave quantity, older adults showed diminished prioritization of negative central details, which can limit their ability to prioritize salient and goal-relevant information. Conversely, preserved slow-wave quantity and quality, along with steeper REM activity, supported age-related positivity in affective interpretation, which may promote psychological resilience and well-being in later life.

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0104

DOES THE MENSTRUAL CYCLE AFFECT HOW DREAMING SHAPES EMOTIONAL MEMORY AND REACTIVITY?

Jing Zhang¹, Andres Pena², Negin Sattari Barabadi³,
Alessandra Shuster², Allison Morehouse⁴, Fiona Baker³,
Katharine Simon², Sara Mednick²

¹Massachusetts General Hospital/ Harvard Medical School,

²University of California, Irvine, ³SRI International

Introduction: Sleep supports emotion regulation by preferentially consolidating emotional memories while attenuating reactivity. We have shown that dream recall plays an active role by increasing negative over neutral memories and reducing reactivity. In women, fluctuating reproductive hormones across the menstrual cycle influence sleep features implicated in emotional memory, yet whether menstrual phases influence how dreams shape emotional processing remains unknown. This study investigates how dreams shape sleep-dependent emotional processing across the menstrual cycle in naturally cycling women.

Methods: 128 women (Mage = 32.85 ± 11.93 years) completed up to four visits across verified menstrual phases (menses, late-follicular, mid-luteal, late-luteal). At each visit, participants performed the Emotional Picture Task with negative and neutral IAPS images in the evening (Test 1) and the next morning (Test 2). Participants rated old/new, arousal, and valence of images shown at each test. Dream reports were collected upon waking prior to Test 2. Linear mixed-effects models tested main and interaction effects of menstrual phase and dream recall.

Results: The menstrual cycle altered how dreaming shaped overnight emotional memory. Dream recall typically benefited the emotional trade-off effect—favoring consolidation of negative relative to neutral images ($\Delta d'$; $t(410)=1.95$, $p=0.05$)—but this pattern reversed during the late-luteal phase (dream × menstrual cycle: $t(381)=-2.29$, $p=0.02$). Dreaming showed independent effects on emotional reactivity. Higher valence and arousal ratings for negative images during Test 1 predicted greater dream recall (valence: $t(344)=2.05$, $p=0.04$; arousal: $t(327)=2.04$, $p=0.04$). Additionally, the more negatively participants rated the images at Test 1, the more negative their dreams tended to be ($t(166)=-2.11$, $p=0.04$). Dream recall was linked to reduced next-morning emotional reactivity (valence: $t(413)=-2.89$, $p=0.004$; arousal: $t(413)=-2.65$, $p=0.01$), with stronger reductions following more negative dreams ($\beta=0.15$, $t(182)=2.86$, $p=0.005$).

Conclusion: Menstrual cycle phase influenced how dreams shaped overnight emotional memory. Negative waking experiences increased dream recall and shaped dream content—and recalling dreams, especially negative ones, reduced emotional reactivity and typically strengthened emotional memory—but this benefit disappeared in the late-luteal phase when there are declining reproductive hormones. These findings suggest a novel interaction between the menstrual cycle and dreaming, showing

that hormonal fluctuations reshape how sleep and dreams regulate emotional experience and memory.

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0105

EFFECTS OF EMOTION REGULATION ON NEGATIVE MEMORY IN INSOMNIA: PRELIMINARY FINDINGS

Shengzi Zeng, Seo Ho Song, Tony Cunningham

Beth Israel Deaconess Medical Center

Introduction: While sleep disruption is linked to maladaptive processing of emotional information, the mechanisms through which emotion regulation strategies influence subsequent memory, especially among those who suffer from chronic sleep disturbance, remains poorly understood. This ongoing study examined how different emotion regulation strategies affect memory for aversive stimuli in (1) healthy individuals following multiple nights of normal sleep or sleep restriction and (2) patients diagnosed with insomnia disorder.

Methods: Seventeen healthy controls completed a normal-sleep protocol (HCNS), and 17 healthy participants completed a sleep-restriction protocol involving 4-hour sleep per night for three consecutive nights in hospital settings (HCSR). Ten patients with insomnia disorder (ID) completed the same protocol as the HCNS group. After sleep manipulation, participants completed an emotion regulation task involving maintain, suppression, and reappraisal conditions for 60 highly aversive images. This was followed by a surprise recognition memory test including the previously encoded images and 60 novel foils. Recognition accuracy for old and new images was calculated separately.

Results: For old images, we found a significant main effect of Condition (maintain vs. suppression vs. reappraisal), $p = 0.026$. Pairwise comparisons suggested that participants recalled reappraised images significantly better than suppressed images. This effect was primarily driven by the HCNS group; however, the Group × Condition interaction was not significant ($p = .412$). There were no significant group differences in recognition accuracy for new images ($p = .885$).

Conclusion: Preliminary analyses suggest that emotion regulation strategy influences memory for negative images, with reappraisal enhancing subsequent recognition relative to suppression. Although this effect appeared most pronounced in healthy individuals with normal sleep, neither chronic nor protocol-induced sleep loss significantly altered the overall pattern of memory modulation. These findings remain provisional, and final conclusions will be drawn upon completion of data collection (target N = 25 per group).

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0106

NEW INSIGHTS INTO THE SPATIOTEMPORAL ORGANIZATION OF SLEEP MICRO-ARCHITECTURE: SPINDLES, SLOW OSCILLATIONS AND PHASE PRECESSION OF SPINDLE-SO COUPLING

Alex Bender¹, Madeline Taubkin¹, Mia Bothwell¹, Kyle Pellerin¹, Milena Pavlova², Rani Sarkis², Sydney Cash¹, Alice Lam¹

¹Massachusetts General Hospital, ²Brigham and Women's Hospital

Introduction: Spindles (11-16 Hz) and slow oscillations (0.5-1.5 Hz; SO) are fundamental elements of the NREM sleep microarchitecture, often co-occurring in a phase-dependent manner. This cross-frequency coupling is critical for the temporal coordination of neural activity in sleep and for memory consolidation. However, each of these elements occur locally at different times and in different regions across the brain. In this study, we present evidence in humans for a novel spatiotemporal relationship between spindles and SO, termed phase precession, and then compare the properties of this relationship across the lifespan.

Methods: We studied 101 participants free of major neurological disease, ranging in age from 20 to 85 years. Continuous overnight scalp EEG was sleep-staged, and spindles and SO were detected, using previously-published algorithms. The SO phases corresponding to spindle detections were plotted against the anterior-posterior scalp position. Circular-linear statistics were then used to determine the best fit line, and quantify the slope, strength (R value), and significance. Linear and logistic regression models were used to test the association of these phase precession parameters with demographics.

Results: Visual inspection of circular phase plots across the brain topography revealed a striking pattern. There was a systematic shift in phase, with spindles occurring at sequentially earlier SO phases relative to their anterior-posterior position. Phase-position plots confirmed this relationship at both an individual and group level. Examining phase precession properties across demographics, we found that older age is associated with reduced phase precession strength ($F=5.15$, $b=-0.001$, $R=0.37$, $p=0.008$), and a flattening of the slope ($F=2.64$, $b=-0.005$, $R=0.23$, $p=0.016$). In contrast, we did not find any significant differences between male and female sex ($p>0.05$).

Conclusion: We report a novel spatiotemporal organization of spindle-SO coupling, characterized by a systematic precession of the SO phase of spindles along the anterior-posterior axis of the brain. We speculate that phase precession provides a potential mechanistic explanation for how the coupling of sleep oscillations could support memory consolidation in a coordinated manner across the brain. Underscoring its relevance, we show that the integrity of phase precession strength and slope declines with advancing age.

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0107

RECIPROCAL SCALING BETWEEN SLOW OSCILLATION-SPINDLE TRAVELING WAVES AND COUPLING AS A COMPUTATIONAL PRINCIPLE FOR MEMORY REORGANIZATION DURING SLEEP

Thea Ng¹, Morgan Barnes², Irina Orlovsky², Cassandra Delvey², Lena Gaudette², Lindsey Mooney³, Katrina Rodheim², Karolina Rusin², Bethany Jones², Rebecca Spencer²

¹Mount Holyoke College, ²University of Massachusetts Amherst,

³University of California, Davis

Introduction: Sleep reorganizes newly encoded memories into long-term storage through coordinated neural dynamics. In humans, slow oscillation-spindle (SO-SP) coupling during NREM sleep correlates with post-sleep memory improvement, but whether it reflects an active mechanism for long-distance communication or indexes other underlying processes remains unclear. We examined whether the spatiotemporal structure of SO-SP coupling constitutes a computational framework for memory reorganization during sleep.

Methods: High-density polysomnography dataset 1: young adults ($N=15$) and older adults ($N=15$) completed emotional memory tasks on nap and wake days. Dataset 2: young adults ($N=35$) performed word-pair learning on overnight and wake days. A Convolutional Neural Network with Long Short-Term Memory separated planar, rotating, and local SO-SP traveling waves. Coupling phase was quantified as the absolute distance of the preferred phase from the SO peak, and coupling strength by mean vector length (MVL). Traveling groups were identified when $>10\%$ of electrodes within a 200-ms window formed a unidirectional, spatially adjacent cluster. Partial derivatives of phase-gradients estimated propagation direction and speed, phase-gradient directionality (PGD) indexed inter-electrode consistency with the dominant direction defined by the mixture component with the greatest variance, and axial MVL quantified inter-event directional consistency. Statistics were derived from 10,000 permutations.

Results: In SO-SP coupled events in young adults, 61.5% exhibited simultaneous traveling dynamics. Planar SOs predominantly propagated along the anterior-posterior axis (87.5%), while SPs rotated along a temporal-parietal-frontal pathway across events (72.6%, $ps<0.01$). In uncoupled events, neither wave showed a preferred direction ($ps>0.59$). Coupled events exhibited greater inter-electrode directional consistency (PGD=0.62) than uncoupled events (PGD=0.42, $p<0.001$), predicting post-sleep memory benefits ($p=0.023$). In turn, traveling SO-SPs showed more precise coupling phases (0.04rad) and strength (MVL=0.12) compared to isolated events (0.17rad, MVL=0.02, $ps<0.001$). Coupling and propagation demonstrate reciprocal scaling, whereby more precise and stronger coupling accompanies more consistent propagation and vice versa. In older adults, traveling wave proportion decreased (40.5%), and propagation range was reduced, disrupting coupling-propagation scaling ($ps>0.05$).

Conclusion: SO-SP coupling constitutes an active traveling-wave-based computation, in which reciprocal modulation between coupling and propagation implements cross-frequency alignment across cortical spatiotemporal scales, efficiently reorganizing memory representations over long-range during sleep. This computational capacity declines with aging.

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0108

SPATIAL MEMORY AND NAVIGATION PERFORMANCE ACROSS THE MENSTRUAL CYCLE

Katharine Simon¹, Negin Sattari Barabadi¹, Alessandra Shuster¹, Allison Morehouse¹, Jizhi Zhang¹, Jing Zhang¹, Andres Pena¹, Elisabet Alzueta², Marie Gombert², Weining Shen¹, Fiona Baker², Sara Mednick¹

¹University of California, Irvine, ²SRI International

Introduction: Some studies have reported that the menstrual cycle and fluctuating sex hormones influence sleep microarchitecture, which may in turn shape sleep-dependent memory processes. We examined within-person menstrual cycle dynamics on spatial memory and navigation performance. The Minecraft Memory and Navigation (MMN) task was administered to participants during four distinct menstrual phases: menses, late follicular, midluteal (ML), and late luteal. Our goal was to determine whether variations in sex hormones and sleep spindles across the cycle predicted changes in spatial memory and navigation performance.

Methods: Forty-three reproductive-aged female participants (18–35yrs) completed the MMN task four times, once per menstrual phase. During training, participants learned the locations of 12 objects across two training trials. Immediate pre-sleep and delayed post-sleep recall were tested by being teleported to random points in the environment and then navigating to remembered object-locations and placing the objects. Training analyses evaluated environment exploration, measured as the area of the environment covered while searching for objects. MNN test analyses examined spatial memory accuracy (Euclidean distance between true and indicated object-locations), navigation metrics (area explored and total steps), and we evaluated sigma power (12–15Hz). All within-subject variables were z-transformed and linear models fit.

Results: We found menstrual cycle effects on navigation, with participants in the ML, compared to other phases, spending more time during the exploration period ($p=0.02$), but showing worse spatial memory accuracy for the objects at immediate recall ($p=0.018$). However, overnight changes in navigation performance or spatial memory did not vary by menstrual cycle phase. A main effect of parietal sigma activity (12–15Hz) predicted greater overnight spatial memory accuracy improvement ($p=0.034$).

Conclusion: During the high-hormone ML phase, participants showed more exploratory navigation during learning but performed worse on the immediate pre-sleep test, which could reflect broader spatial search ability and challenges to retain specific spatial locations. We also found that sigma power was associated with overnight spatial memory performance gains, but not overnight changes in navigation behaviors. Despite the role of spindles in overnight spatial memory improvement on this real-world, immersive spatial navigation task, we did not find that

the menstrual cycle modulated these sleep-dependent memory processes.

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0109

SLOW-WAVE SLEEP MEDIATES THE COMPENSATORY EFFECTS OF ACUTE MODERATE-INTENSITY EXERCISE ON LONG-TERM MEMORY DEFICITS IN SLEEP RESTRICTION

Emmanuel Frimpong¹, Melodee Mograss¹, Jocelyn Dautet-Plourde¹, Nicole Milbrath¹, Francois Pointeau¹, Manlu Xu¹, Ngoc Long Khang Nguyen¹, Tehila Zvionow¹, Mylène Aubertin-Leheudre², Louis Bherer³, Veronique Pepin¹, Arsenio Paez¹, Edwin Robertson⁴, Thien Thanh Dang-Vu¹

¹Concordia University, ²Université du Québec à Montréal,

³University of Montreal, ⁴University of Glasgow

Introduction: While adequate sleep promotes optimal cognitive functioning, sleep deprivation impairs memory functions. Physical exercise enhances sleep architecture, including slow-wave sleep (SWS), and enhances memory, and may thus counteract the detrimental effects of sleep loss on memory. We evaluated whether acute moderate-intensity exercise compensates for the detrimental effects of nighttime sleep restriction on declarative memory and if SWS mediates the compensatory effect in healthy young adults.

Methods: Eighty-eight healthy young adults (52% female; 24.0 ± 3.8 years) were randomly assigned to one of four groups based on exercise and sleep opportunity: average sleep only (S8, 8.5 hours/night), restricted sleep only (S5, 4.5 hours/night), and moderate-intensity exercise before restricted sleep (ExS5) or average sleep (ExS8). Participants completed either a 30-minute evening cycling at 55–60% of their individual maximal oxygen consumption or seated rest (7:00 p.m.) prior to learning 80 face-name pairs (10:00 p.m.), followed by immediate recall and delayed recall involving 120 face-name pairs (80 studied plus 40 new faces) after polysomnography-recorded sleep.

Results: We found a significant exercise $\times$ sleep interaction for delayed recall performance (discriminability index, d' ; $p = 0.033$, $\eta p^2 = 0.056$) and the difference between delayed and immediate recalls ($p = 0.012$, $\eta p^2 = 0.077$). Post hoc analyses showed that the delayed retrieval d' of ExS (0.07 ± 0.89) was not statistically different from those of the S8 (0.58 ± 1.20 , $p = 0.115$) and ExS8 (0.21 ± 1.30 , $p = 0.747$) but was significantly higher than the S5 (-0.60 ± 1.38 , $p = 0.028$). Similarly, the delayed retrieval d' of S5 was significantly lower compared to those of S8 ($p < 0.001$) and ExS8 (0.21 ± 0.30 , $p = 0.029$). Likewise, the difference in d' of ExS5 (0.36 ± 0.79) was significantly higher than the S5 (-1.13 ± 1.02 , $p < 0.001$). The percentage of SWS mediated the compensatory effects of the ExS5 vs. S8 condition on long-term memory ($B = 20.38$, $SE = 16.49$, 95% bootstrap CI (5.70, 59.99)).

Conclusion: These results suggest that acute moderate-intensity evening exercise enhances sleep-dependent memory consolidation and compensates for the detrimental effects of sleep restriction on long-term declarative memory, through mechanisms involving slow-wave sleep.

Support (if any):

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0110

SLEEP FRAGMENTATION ELEVATES BLOOD PRESSURE AND ALTERS PARASYMPATHETIC ACTIVITY DURING SLOW WAVE SLEEP IN RATSShirleen Xu¹, Laura Hentig², Siobhan Lawler³, Li Yang³, Jennifer Barb³, Anne Fink⁴, Katherine Maki³¹National Institutes of Health, ²University of Colorado, Colorado Springs, ³National Institutes of Health Clinical Center,⁴University of Illinois at Chicago

Introduction: Sleep plays a major role in health and chronic sleep disruption can increase cardiometabolic disease risk. Spectral analysis of physiologic data quantifies signal power across defined frequency bands, providing a measure of sleep architecture and heart rate variability (HRV). HRV reflects the body's capacity to adapt to physiological stressors, including sleep fragmentation (SF), because it indexes autonomic regulation of vascular tone and blood pressure (BP). This study evaluates whether SF increases cardiovascular disease risk by altering BP and autonomic regulation, as measured by HRV.

Methods: Male Wistar-Kyoto rats were implanted with telemetry transmitters to record BP and cortical electroencephalogram (EEG) signals (Data Sciences International). Animals were maintained on a 12:12 light-dark cycle (Zeitgeber Time [ZT] 0–12 light; ZT12–24 dark). Rats were randomized to 8 hours (ZT1–9) of daily SF via a mechanical sweeper bar (n=8) or undisturbed controls (n=7). EEG were recorded over intervention (28-days) and recovery (7-days). HRV and BP during slow wave sleep (SWS) in the bar on period were quantified from systolic peak intervals (aortic BP tracing) to generate high frequency (HF) band power and square root of the mean squared RR-interval difference (rMSSD) metrics.

Results: The SF intervention increased mean arterial pressure (MAP) during SWS over time (group x time, $p < .0001$), where at day 28, SF rats had elevated MAP vs. controls (+7.24, $p = .016$). SF also differentially impacted HRV responsiveness in SF rats vs. controls across intervention and recovery in metrics including HF band power and rMSSD (both group x time $p < .01$). Notably, rMSSD was elevated in SF vs. control animals at int10 (+2.30, $p = .007$) and int28 (+2.39, $p = .009$), which normalized during recovery ($p > .05$ across all days).

Conclusion: Increased HF power and rMSSD may reflect enhanced parasympathetic activation as a homeostatic autonomic nervous system response to SF-induced BP elevations during SWS. Ongoing analyses are evaluating whether changes in HRV are sustained during bar off periods and the relationships between sleep quality, HRV, and BP outcomes.

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0111

LATER CIRCADIAN TIMING OF THE ONSET OF EATING IS LINKED TO WORSE INFLAMMATORY BOWEL DISEASE OUTCOMESDonghan Su, Erica C. Jansen, Cathy Goldstein, Shirley Cohen-Mekelburg, Karen Peterson, Elizabeth Hudson, Peter Song, Helen Burgess
University of Michigan

Introduction: Circadian disruption related to misalignment between food-intake timing and endogenous circadian rhythms may contribute to the onset and exacerbation of Inflammatory Bowel Disease (IBD) symptoms. Here, we investigated whether circadian meal timing, regularity, and eating window were associated with intestinal inflammation, clinician-rated disease severity, and self-reported quality of life among patients with IBD.

Methods: We leveraged baseline data from a randomized clinical trial of adults with active Crohn's disease or ulcerative colitis (N=39). Participants completed seven days of food-timing logs and wore a Fitbit Charge 5™ to monitor sleep and activity at baseline. Circadian meal timing was calculated as the difference between the timing of each meal and sleep midpoint corrected for the sleep-debt accumulated over the week (MSFsc). Additional exposures of interest included day-to-day variability in meal timing, eating window duration, and breakfast skipping. Outcomes were measured at day 8 following the baseline assessment of sleep and food-timing logs. Outcomes included fecal calprotectin (intestinal inflammation), quality of life assessed by self-reported Short Inflammatory Bowel Disease Questionnaire (SIBDQ), and clinician-rated disease activity (active vs. inactive). We used linear and logistic regression models adjusted for age, sex, IBD type, and disease duration.

Results: Later circadian timing of the first meal was significantly associated with higher intestinal inflammation (β : 0.427; 95%CI: 0.159, 0.694) in the adjusted model. Similarly, greater day-to-day variability in the circadian timing of the first meal was significantly associated with lower quality of life scores (β : -4.99; 95% CI: -8.59, -1.39). A longer eating window was significantly associated with lower intestinal inflammation (β : -0.244; 95%CI: -0.486, -0.001) and was also associated with better quality of life and lower disease activity, though not statistically significant. Breakfast skipping showed unfavorable but non-significant associations across all outcomes.

Conclusion: Circadian misaligned eating patterns—particularly a later circadian onset of eating and greater irregularity in meal timing—was associated with higher intestinal inflammation and poorer quality of life in adults with IBD. These findings highlight circadian-aligned eating behaviors as a potential avenue for adjunctive, non-pharmacologic therapeutic strategies in IBD.

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0112

INCREASING SLEEP REGULARITY IS ASSOCIATED WITH IMPROVEMENTS TO HEART RATE VARIABILITY IN HEALTHY ADULTSBrooke Shafer¹, Georgi Brady², Courtney Lysiak¹, Sophia Kogan¹, Andrew McHill¹¹Oregon Health & Science University, ²Mayo Clinic

Introduction: Sleep regularity has been shown to be a stronger predictor of mortality compared to sleep duration, though the underlying mechanisms are incompletely understood. Heart rate variability (HRV), a measure of cardiac autonomic modulation, is associated with cardiovascular morbidity and mortality. While HRV is traditionally analyzed using linear methods (e.g., frequency-domain analyses), there is growing interest in non-linear measures to assess the dynamic complexity of cardiac regulation. However, the influence of sleep regularity on both

linear and nonlinear HRV is unclear. We therefore assessed the association between sleep regularity and HRV in healthy adults.

Methods: HRV was obtained in 12 participants (6 female) via electrocardiography during 10-min supine rest and assessed using linear (high frequency [HF]; low frequency [LF]/HF ratio) and non-linear (detrended fluctuation analysis [DFA]- α 1 and - α 2) indices. Sleep regularity was quantified using the standard deviation (SD) of diary-determined sleep onset across ~14 days. Participants were classified as regular (SD < 1h; n=5) or irregular sleepers (SD ≥ 1h; n=7). Irregular sleepers were instructed to maintain a consistent sleep onset (±30min) for 12-weeks. Differences between groups were assessed using independent t-tests and relationships between SD sleep onset and HRV were assessed using Pearson correlation analyses.

Results: There were no differences between groups in age (mean±SD, irregular vs. regular, respectively; 30.7±7.8 vs. 27.2±8.5y; p=0.23), sleep onset timing (24:38±1:45 vs. 23:37±1:14; p=0.14), or DFA- α 2 (0.27±0.11 vs. 0.36±0.20; p=0.16). At baseline, irregular sleepers had higher SD sleep onset (1.4±0.4 vs. 0.8±0.2h; p< 0.01), LF/HF ratio (2.4±1.8 vs. 0.6±0.5%; p=0.03), DFA- α 1 (1.10±0.22 vs. 0.81±0.20; p=0.02), and lower HF (37.1±20.5 vs. 63.1±7.1nu; p=0.02). In the entire sample, SD sleep onset was inversely correlated with HF (r=-0.63; p=0.02) and positively correlated with LF/HF ratio (r=0.75; p< 0.01) and DFA- α 1 (r=0.61; p=0.03) at baseline. At 12-weeks, the change in SD sleep onset was inversely correlated with change in HF (r=-0.79; p< 0.01) and positively correlated with change in LF/HF ratio (r=0.77; p< 0.01) and DFA- α 1 (r=0.66; p=0.01).

Conclusion: Irregular sleep patterns are associated with altered cardiac regulatory dynamics and may be one mechanism contributing to adverse outcomes. Improving sleep regularity may be a potential interventional target to improve the autonomic balance and cardiovascular adaptation.

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0113

CHRONIC SLEEP RESTRICTION DECREASES MATURE BONE HEALTH IN THE RODENT MODEL

Carol Everson¹, Mei Wang¹, Jeffrey Toth²

¹Medical College of Wisconsin, ²Marquette University

Introduction: Chronic sleep restriction (SR) results in numerous disease risks. One emerging disease risk is osteoporosis, brought to light by both epidemiological studies and initial experimental findings. The purpose of the present study in rats was to determine the extent to which chronic SR affects bone quality (e.g., microstructure) and integrity (e.g., fracture risk) in middle age, the age interval of numerous epidemiological findings. The laboratory rat is a preferred animal for evaluation of bone health relevant to humans because of its well-characterized skeleton, comparable biochemical markers, and similar methodology for measurement of bone density and microarchitecture.

Methods: Male Sprague-Dawley rats began study at 11–12 months of age, at which time bone remodeling prevails over bone modeling, and linear growth has declined to a negligible level. Using

a well-validated paradigm, rats underwent repeated long bouts sleep reduction of 35% of normal values, interspersed with “week-ends” of sleep ad libitum to model a workweek. A duration of 66 days allowed intrinsic changes to manifest, theoretically equivalent to 6.5 years in humans. Ambulation control (AC) rats were studied under similar experimental conditions but with validated, lengthier opportunities for sleep. Biomechanical testing of harvested femurs was conducted by 3-point bending. Intrinsic biomechanical properties, including the ultimate stress and strain, elastic modulus, and work to failure were derived based on the structural and geometric femoral properties. Harvested femurs and vertebrae (L4) were studied for changes to bone microarchitecture by micro-computed tomography.

Results: Compared to the AC group (N=8), significant reductions in biomechanical determinants of bone integrity and fracture risk were found in femora of male SR rats (N=8): ultimate force (-18.3%, p< 0.017), stiffness (-13.8%, p< 0.013), and ultimate stress (-19.1%, p< 0.041). Microarchitectural changes in the L4 vertebra of SR rats included decreases in bone mineral density, bone volume/total volume, and trabecular thickness (-4%, -6%, and -5% respectively, all p< 0.008) and a tendency for decreased trabecular number (-5%, p< 0.07).

Conclusion: Chronic sleep restriction results in reduced vertebral bone quality and decreased femoral integrity during mature adulthood in male rats. These are clinically important sites for fracture risk and surgical recovery in human aging.

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0114

DYNAMIC INSTABILITY OF BREATHING DURING SLEEP PREDICTS COGNITION, DISEASE, AND MORTALITY

Wolfgang Ganglberger, Haoqi Sun, M. Brandon Westover, Robert Thomas

Beth Israel Deaconess Medical Center

Introduction: Breathing during sleep fluctuates across time and sleep stage, yet clinical assessment relies almost entirely on event counts and desaturation metrics. We developed an interpretable measure of nocturnal respiratory dynamics—the Breathing Stability Index (BSI)—and evaluated whether it predicts cognition, clinical disease, and mortality independent of traditional sleep-disordered breathing indices.

Methods: We analyzed 15,000 overnight polysomnograms from a clinical cohort at Massachusetts General Hospital and a community-based cohort from the Osteoporotic Fractures in Men study. From thoraco-abdominal effort signals we computed BSI, a continuous dimensionless time series quantifying how rapidly and strongly breathing amplitude deviates from its local baseline, along with nightly summary features. We examined relationships between BSI, apnea-hypopnea index (AHI), hypoxic burden, and sleep stage. Predictive models for cognition and 12 EHR-derived diseases were trained using cross-validated splits with strict subject separation. All-cause mortality risk was estimated using a cross-validated Cox proportional hazards model.

Results: BSI increased stepwise across AHI severity strata but showed only moderate correlations with AHI and hypoxic burden, indicating complementary physiological information. Within individuals, instability declined progressively from N1 to N2 to N3 and increased again in REM sleep. Using BSI features alone, out-of-fold correlations reached $r=0.24$ for fluid cognition and $r=0.20$ for total cognition, with minimal improvement when adding AHI or hypoxic burden. For disease prediction, BSI improved discrimination over demographics and over models using AHI or hypoxic burden alone (ROC-AUC 0.56–0.65 across conditions). Each 1-SD increase in instability predicted higher mortality in MGH (HR 1.67, 1.49–1.88) and MrOS (HR 1.11, 1.06–1.16). Age adjustment reduced but did not remove the effect in MGH (HR 1.25, 1.12–1.40) and eliminated it in MrOS (HR 1.02, 0.97–1.07).

Conclusion: Nocturnal breathing stability reflects a dynamic, clinically relevant dimension of sleep-disordered breathing. It complements event-based and desaturation metrics and provides independent information related to cognition, multimorbidity, and survival. Incorporating breathing-stability measures may improve individualized risk assessment and inform interventional studies targeting respiratory-control dynamics.

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0115

CANNABIS TO IMPROVE SLEEP DURATION AND DIFFERENCES IN HIGH-SENSITIVITY C-REACTIVE PROTEIN BY ROUTE OF USE AMONG YOUNG ADULTS IN THE HERBAL HEART STUDY

Kylee Krivijanski¹, Denise Vidot², Bria-Necole Diggs², Amrit Baral³, Girardin Jean-Louis²

¹University of Miami School of Nursing and Health Studies,

²University of Miami, ³Johns Hopkins University

Introduction: We examined the relationship between cannabis use to improve sleep duration, cannabis route of use, and high-sensitivity C-reactive protein (hs-CRP) among an established cohort of young adults in South Florida.

Methods: Data are from the age-, sex-, ethnicity-matched young adults in the Herbal Heart Study - Sleep Ancillary (N=150). Cannabis use (CB+) was self-reported and current use was verified by urine toxicology. Routes of use were categorized as joint ($\geq 85\%$ flower), blunt ($\geq 85\%$ flower with tobacco wrap), vape ($\geq 85\%$ THC-vaporizer), or non-use. Fasting blood hs-CRP was categorized as low (< 1.0 mg/L), average (1.0 – 3.0 mg/L), or high (> 3.0 mg/L). Mantel-Haenszel/Pearson χ^2 tests and t-tests were conducted.

Results: Participants (Mage: 25.5y (SD=5.1) were primarily female (67.3%) and Hispanic/Latino (51.3%), and 63.3% were current cannabis users. Over half of CB+ (56.8%) reported using cannabis to improve sleep duration (SD; joint: 57.9%; blunt: 52.0%; vape: 59.4%). Demographic characteristics did not differ across CB+ groups. Indica products were reported more frequent among those using cannabis to improve SD versus those who did not (30.9% vs. 6.7%, $p=0.01$). High inflammation (hs-CRP > 3 mg/L) was more prevalent among CB+ using cannabis to improve SD

(25.9%) compared with non-users (18.4%) and CB+ who did not use cannabis for SD (8.9%, $p=0.04$). Mean hs-CRP was also higher among sleep-motivated users (2.53 mg/L [SD=3.39]) vs. their counterparts (1.70 mg/L [SD=2.35]). Among CB+ using cannabis to manage SD, high hs-CRP varied by route (vape 31.6%, joint 28.6%, blunt 7.7%). Among CB+ not using cannabis for SD, high hs-CRP was seen in blunt (16.7%) compared to vape (7.7%), and joint (0.0%) consumers.

Conclusion: Consuming cannabis to improve SD was associated with higher levels of inflammation. Routes of use modified the association, with higher inflammation among vape and joint consumers, suggesting that motivations for use and consumption routes may differentially relate to modulatory effects of cannabis in inflammation and sleep.

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0116

ASSOCIATIONS BETWEEN SUBJECTIVE SLEEP VARIABILITY AND INFLAMMATORY CYTOKINES FROM EARLY PREGNANCY TO ONE YEAR POSTPARTUM

Kaitlyn Butler¹, Judith Carroll², Kharah Ross³, Mary Coussons-Read⁴, Chris Dunkel Schetter², Rebecca Cox¹, Michele Okun⁴

¹Washington University in St. Louis, ²University of California, Los Angeles, ³Athabasca University, ⁴University of Colorado, Colorado Springs

Introduction: Cytokine levels fluctuate throughout gestation in healthy pregnancy, but excessive inflammation is associated with sleep disruption and poor maternal outcomes. Sleep intra-individual variability (IIV), a correlate of insomnia, is not captured by traditional assessments of average sleep and may uniquely contribute to inflammation across the perinatal period. We investigated whether subjective sleep IIV was associated with inflammatory cytokine levels across the perinatal period.

Methods: A subsample of participants in the Healthy Babies Before Birth study (N=142 women) completed the Pittsburgh Sleep Quality Index and blood samples at 8-16 and 30-36 weeks pregnant and 6 and 12 months postpartum. We defined high vs. low IIV in 4 variables: 1. PSQI total (global sleep quality), 2. sleep duration, 3. midsleep timing, and 4. sleep efficiency. We calculated within-person standard deviation for each variable and designated the top and bottom 30% as high vs. low IIV, respectively. Cytokines were assayed using a custom V-PLEX human immunoassay plate (Meso Scale Discovery) and included IFN- γ , IL-6, IL-8, IL-10, and TNF- α . We tested ANOVAs for each sleep IIV variable on each cytokine across the 4 timepoints. Results are reported as estimated marginal means (EMM). All p-values were FDR-corrected.

Results: Women with high IIV in global sleep quality (EMM=1.51, SE=0.05) exhibited significantly lower IL-8 at 6 months postpartum compared to women with low IIV (EMM=1.71, SE=0.05, $p < 0.05$), but not at the other timepoints. Women with high IIV in midsleep timing (EMM=1.04, SE=0.03) exhibited significantly lower TNF- α at 12 months postpartum compared to women with low IIV (EMM=1.16, SE=0.03, $p < 0.05$), though not at other

timepoints. Women with high IIV in sleep efficiency ($EMM=0.36$, $SE=0.03$) exhibited significantly higher IL-10 at 30-36 weeks pregnant compared to women with low IIV ($EMM=0.25$, $SE=0.03$, $p<0.05$), but not at other timepoints. IL-6 and IFN- γ results were not statistically significant.

Conclusion: Greater variability in subjective sleep was related to inflammatory markers across pregnancy and postpartum. Circulating inflammatory cytokines during postpartum are not well studied, and their clinical relevance remains unclear. Further examination of the relationships between sleep and inflammation in pregnancy and postpartum is warranted.

Support (if any): NIH R01HD073491; NIH K23MH137376; McDonnell Center for Systems Neuroscience

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0117

MULTI-ORGAN INFRASLOW COUPLING AMONG CYCLIC ALTERNATING PATTERN, CARDIOPULMONARY COUPLING, AND BREATHING INSTABILITY

Mira Xu¹, Shaun Purcell², Can Zhang³, Janet Mullington⁴, Wolfgang Ganglberger⁴, Julia Ma⁵, M. Brandon Westover⁴, Haoqi Sun⁴, Robert Thomas⁴

¹Lexington High School, ²Brigham and Women's Hospital,

³Massachusetts General Hospital, ⁴Beth Israel Deaconess Medical Center, ⁵University of Massachusetts, Amherst

Introduction: Cyclic alternating pattern (CAP) occurs during NREM sleep and is a marker of sleep instability. The CAP A phases occur at intervals of mostly 30-50 seconds (2-60 seconds by definition) in the infraslow frequency range ($<0.05\text{Hz}$). Low-frequency coupling (LFC) in cardiopulmonary coupling (CPC) and breathing instability are more commonly observed during CAP phase A, reflecting autonomic instability. However, it is unknown whether there is a coupled network of the brain, heart, and respiratory system. Here, we hypothesized that CAP, CPC, and breathing instability are coupled and therefore form a multi-organ infraslow oscillation, which we term "MISO", and that the strength of this coupling differs across A1, A2, A3, and B phases of CAP, and across diseases.

Methods: We analyzed overnight polysomnograms (PSGs) from 108 participants in the PhysioNet CAP Database, including 16 healthy adults and 7 diseases. CAP phases were manually annotated. For 107 participants with ECG, CPC was calculated as coherence between RR-intervals and ECG-derived respiration, and then converted to the log-ratio between LFC (0.01-0.1Hz) and HFC (0.1-0.4Hz) as $\log(L2H)$. For 34 participants with respiration belts, breathing instability (BSI) was computed from chest and abdomen belts. The coupling was estimated as Cohen's d between a CAP phase vs. non-CAP for CPC or BSI. Comparisons among CAP phases were assessed using Kruskal-Wallis test (omnibus) followed by Dunn's test. The omnibus test was Bonferroni-corrected. Same-CAP-phase across-disease differences were assessed using ANCOVA, controlling for age and sex.

Results: The participants were aged 14-82 years, with 39% female. In healthy participants, CAP-CPC coupling was stronger for A3 (Cohen's $d=0.51$ for $\log(L2H)$) compared to non-CAP) and A2 (0.24), than A1 (-0.07) and B (0.05). CAP-BSI coupling was stronger for A3 (1.0) than A2 (0.19), A1 (-0.06), and B (0.04). However, there were no significant across-disease differences in CAP-CPC or CAP-BSI coupling within the same CAP phase. A3 showed stronger coupling to CPC and BSI across diseases.

Conclusion: CAP (especially A3), CPC, and breathing instability exhibit temporal coupling across healthy and pathological sleep, supporting a multi-organ infraslow oscillation (MISO) underlying NREM sleep stability. The clinical significance should be investigated in neurological and cardiopulmonary disorders.

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0118

PERIPHERAL ADENOSINE METABOLISM IS AFFECTED BY DISTINCT SLEEP DIMENSIONS IN PEOPLE WITH AND WITHOUT HIV

Priya Borker¹, Bernard Macatangay², Alison Morris³, Benjamin Morris², Jennifer Roscher², Eugenio Alvarez², Sanjay Patel⁴

¹University Hospitals Cleveland Medical Center, ²University of Pittsburgh, ³Rutgers University, ⁴Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: Poor sleep increases peripheral inflammation, but the underlying mechanism is unclear. Extracellular adenosine (ADO) metabolism occurs via ectoenzyme CD39 and CD73 activity, and dysregulated purinergic metabolism contributes to HIV-associated inflammation. Sleep affects ADO metabolism in the central nervous system, but its effects on peripheral ADO metabolism have been understudied. We sought to evaluate how peripheral ADO metabolism differs by sleep metrics in people with HIV (PWH) and without HIV (PWOH).

Methods: Virally suppressed PWH with CD4+ count >350 cells/mm³ on stable antiretroviral therapy for >1 year and age- and sex-matched PWOH underwent 14 days of wrist actigraphy. Sleep duration, efficiency, midpoint, and regularity (standard deviation of midpoint) were derived. Blood samples were analyzed by flow cytometry to determine the percentage of T cells expressing one or both purinergic ectoenzymes (CD39 and CD73). Multivariable linear regressions adjusted for age, sex at birth, race, body mass index, and smoking status.

Results: Participants (94 PWH and 87 PWOH) had a mean $\pm$ SD age of 56 ± 11 years and 25% were female. The median (IQR) CD4+ count among PLWH was 763 (578, 982 cells/mm³). Every hour decrease in sleep duration was associated with (mean $\pm$ SE) $4.1 \pm 1.8\%$ fewer CD39+CD8+ T-lymphocytes in PLWH ($p=0.03$) but no association in PWOH ($2.4 \pm 2.6\%$, $p=0.35$). Among PWOH, every hour increase in standard deviation of midpoint was associated with $6.9 \pm 3.4\%$ fewer CD39+CD4+ ($p<0.05$) and $6.5 \pm 3.3\%$ fewer CD39+CD8+ ($p=0.05$) T-lymphocytes. In contrast, there was no

association between regularity and CD39+ positivity in CD4+ ($1.4 \pm 2.0\%$, $p=0.48$) or CD8+ ($1.3 \pm 1.9\%$, $p=0.52$) T-cells among PWH. Neither sleep efficiency nor midpoint were associated with purinergic ectoenzyme expression in PWH or PWOH.

Conclusion: We identified sleep duration was associated with peripheral ADO metabolism in PWH while sleep regularity was associated with peripheral ADO metabolism in PWOH. Future research should investigate if sleep-based interventions, such as sleep extension, improves peripheral adenosine metabolism by in PWH.

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0119

SINGLE-NUCLEUS RNA SEQUENCING UNCOVERS CELL TYPE-SPECIFIC ALTERATIONS IN OSA-RELATED LIVER INJURY

Lida Chen, Li Lin

Zhangzhou Affiliated Hospital of Fujian Medical University

Introduction: Chronic intermittent hypoxia (CIH), a hallmark feature of obstructive sleep apnea (OSA), is strongly implicated in the development of hepatic injury. However, the cellular mechanisms underlying CIH-induced liver dysfunction remain poorly understood. This study aimed to systematically characterize the hepatic cellular responses to CIH at single-cell resolution.

Methods: A rodent model of CIH was established and subjected to histological and transcriptomic analyses. Single-nucleus RNA sequencing (snRNA-seq) was performed to delineate transcriptional alterations across liver cell populations. Differentially expressed genes (DEGs) and pathway enrichment analyses were conducted to identify key biological processes and signaling networks affected by CIH exposure.

Results: CIH exposure resulted in marked hepatic injury characterized by spotty necrosis and prominent infiltration of inflammatory cells. SnRNA-seq identified ten major hepatocyte clusters with stable composition but revealed extensive transcriptional reprogramming across multiple hepatic subpopulations. CIH suppressed PPAR signaling and fatty acid metabolism in hepatocytes and hepatic stellate cells and activated AMPK and PI3K-Akt pathways related to stress response and fibrogenic processes. Mononuclear phagocytes showed upregulation of NF- κ B signaling and complement/coagulation cascades. Endothelial cells exhibited changes in genes associated with cytoskeletal organization and tight junctions. T cell subpopulations displayed altered expression of genes involved in metabolic regulation and endoplasmic reticulum stress.

Conclusion: This study provides the first single-cell transcriptomic atlas of the liver under CIH, revealing cell type-specific molecular remodeling across hepatocytes, stromal, and immune cells. These findings elucidate the complex cellular interplay driving CIH-induced hepatic injury and offer novel insights into potential therapeutic targets for OSA-related liver dysfunction.

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0120

LONG-TERM INSOMNIA BURDEN AND INFLAMMAGING AND IMMUNOSENESCENCE IN OLDER ADULTS

Chunyu Liu¹, Marc Kaizi-Lutu¹, Alden Gross¹, Atul Malhotra², Emerson Wickwire³, Jennifer Albrecht³, Kening Jiang⁴, Chien-Yu Tseng⁵, Xiaowen Chen¹, Ginger Chang⁵, Vishaldeep Kaur Sekhon¹, Marcela Blinka¹, Halima Amjad¹, Adam Spira⁴, Christopher Kaufmann⁵

¹Johns Hopkins University, ²UC San Diego Health, ³University of Maryland School of Medicine, ⁴Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, ⁵University of Florida

Introduction: Insomnia is common in older adults and has been linked to multiple diseases, yet its underlying biological pathways remain unclear. Emerging evidence suggests that inflammation and immune system dysregulation play important roles in chronic disease. Therefore, we examined the associations between repeated measures of insomnia burden and biomarkers of inflammaging and immunosenescence.

Methods: We studied 9,709 participants (age=69.34 $\pm$ 9.86 years, 58.7% females, 35.2% non-white) from the Health and Retirement Study (HRS). Insomnia symptoms were assessed biennially from 2002 to 2016 using the adapted Jenkins Sleep Scale. Chronic insomnia burden was defined as the cumulative average Jenkins score (sum of scores/number of interviews). We studied 16 blood-based biomarkers measured in the 2016 HRS Venous Blood Study from three domains: inflammation (CRP, IL-6, MLR, NLR, albumin, TNFR1), immune state (CD8+/CD4+ ratio, CD4+ EMRA/naïve ratio, CD8+ EMRA/naïve ratio, memory/naïve T-cell ratio, memory/naïve B-cell ratio, NK cells low-to-high ratio, CMV+ IgG count), and dual-function (i.e., both inflammatory and immune) cytokines (IL-10, TGF- β 1, IL-1RA). We used linear regression to estimate associations between chronic insomnia burden and biomarkers, adjusting for age, sex, race, education, APOE ϵ 4, BMI, smoking, alcohol use, physical activity, interview start time, and number of interviews.

Results: Higher chronic insomnia symptom burden was consistently associated with higher levels of pro-inflammatory and pro-immune aging biomarkers and lower levels of anti-inflammaging and anti-immune aging biomarkers across inflammation, immune state, and dual-function cytokine domains. Specifically, chronic insomnia burden was associated with higher IL-6, TNFR1, CD8+/CD4+ ratio, CD4+ EMRA/naïve ratio, memory/naïve T-cell ratio, IL-10, and IL-1RA, and with lower albumin and TGF- β 1. After further adjustment for baseline chronic diseases, only the associations with two immune-state biomarkers remained: CD4+ EMRA/naïve ratio ($B = 0.02$ SD, 95% CI: 0.01–0.03) and memory/naïve T-cell ratio ($B = 0.01$ SD, 95% CI: 0.00–0.02).

Conclusion: Chronic insomnia symptom burden was associated with biomarkers of adaptive immunosenescence even after accounting for comorbidities, whereas links with systemic inflammatory markers were largely comorbidity-driven, suggesting immunosenescence as a potential pathway connecting chronic insomnia with later-life health outcomes.

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0121

SLEEP QUALITY PREDICTS SUICIDALITY IN ADOLESCENTSSienna Stevens, Annie Anderson, Janae Lopez, Paige Gunther, Olivia Hubble, Daniel Kay, Kara M. Duraccio
Brigham Young University

Introduction: Sleep variables are consistently linked to mental health outcomes, yet few studies have examined how specific sleep factors predict suicidality in adolescents. Adolescence is a critical development period that involves physical, social, and psychological changes that can influence sleep, making this population vulnerable to sleep-related mental health issues. We aimed to see how specific sleep health variables including sleep quality, duration, efficiency, chronotype, and daytime sleepiness predict suicidality in adolescents.

Methods: Participants included 55 adolescents (ages 14-18, $M=15.8$) who completed the Morning-Eveningness Questionnaire (MEQ) to assess chronotype, the Epworth sleepiness Scale (ESS) to measure daytime sleepiness, and the Pittsburgh Sleep Quality Index (PSQI) to evaluate sleep quality. Suicidality was coded as 1 if the participant's responses endorsed suicidal intent or desire and 0 if their response did not. A logistic regression analysis was used to evaluate the predictive effect of sleep quality, duration, efficiency, daytime sleepiness, and chronotype on adolescent suicidality.

Results: Our logistic regression model was significant, $\chi^2(5)=18.53$, $p=.002$, pseudo $R^2=.28$. Correlations among predictors were small (all $r<.10$), indicating no multicollinearity. Sleep quality was the only significant predictor of suicidality, such that higher PSQI scores were associated with greater odds of suicidality ($OR=1.56$, $p=.003$). Sleep duration approached significance ($p=.058$). The remaining predictors (daytime sleepiness ($OR=0.89$, $p=.169$), chronotype ($OR=1.05$, $p=.308$), and sleep efficiency ($OR=0.91$, $p=.243$) were not significantly related to suicidality.

Conclusion: Our findings suggest that sleep quality is the most meaningful predictor of suicidal intent/desire among adolescents, even when accounting for other sleep parameters. Identifying and addressing poor sleep quality may be a critical component of suicide-risk evaluation and treatment. Clinicians working with adolescents with suicidality may consider integrating evidence-based sleep interventions as a complementary pathway for reducing suicide risk.

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0122

GENETIC FACTORS AND SLEEP TRAITS AS PREDICTORS OF DEPRESSIVE SYMPTOMS: INSIGHTS FROM A LONGITUDINAL FOLLOW-UPMariana Moyses-Oliveira¹, Malú Zamariolli¹, Priscila Tempaku², Andressa Ferruzzi³, José Carlos Fernandes Galduróz³, Monica Andersen⁴, Sergio Tufik³¹Sleep Institute, Associação Fundo de Incentivo à Pesquisa,²Instituto do Sono, Associação Fundo de Incentivo à Pesquisa,³Universidade Federal de São Paulo, ⁴Departamento de

Psicobiologia, Universidade Federal de São Paulo

Introduction: Insomnia and major depressive disorder (MDD) are highly comorbid conditions with a multifactorial etiology.

This study aims to investigate the genetic factors predictive of depressive symptoms and their overall clinical associations - beyond depression itself - and explores the longitudinal relationship between insomnia severity and the trajectory of depressive symptoms over an 8-year period.

Methods: We calculated a polygenic score for depression (depression-PGS) in the São Paulo Epidemiologic Sleep Study (EPISONO) cohort, an epidemiological sample with deep phenotyping, representative of the City of São Paulo. A phenome-wide association study (PheWAS) was performed to explore the relationship between the depression-PGS and 463 diverse phenotypic traits. We assessed the association between depression-PGS with Pittsburgh Sleep Quality Index (PSQI) and Insomnia Severity Index (ISI) scores, in 2007 (baseline, $N=1,042$) and 2015 (follow-up, $N=712$). Multinomial regression models evaluated longitudinal trajectories of depressive symptoms (defined by Beck Depression Inventory-BDI in baseline and follow-up), and investigated the predictive role of PSQI and ISI, as continuous variables, on these trajectories.

Results: The depression-PGS was significantly associated with both continuous and categorical BDI scores in baseline. The PheWAS analysis revealed significant associations between the depression-PGS and 37 traits, predominantly related to neuropsychiatric and sleep phenotypes, including polysomnography variables (total sleep efficiency and latency, REM sleep duration and latency). When BDI status (cases vs. controls) was used as covariate in the PheWAS, higher depression-PGS remained associated with polysomnography-derived sleep efficiency. Higher depression-PGS was associated with poorer sleep quality (PSQI) and greater insomnia severity (ISI) in both time points. The degree of baseline insomnia severity and its change in overtime were predictors for elevation of depressive symptoms in the eight-year period.

Conclusion: Genetic predisposition for depression is associated with a wide range of sleep traits, including polysomnography variables and - for sleep efficiency - this link is independent from symptoms manifestation. The degree of insomnia severity in the baseline, as continuous variable, is predictive of the longitudinal course of depressive symptoms. The usage of insomnia symptoms and genetic vulnerability to predict MDD onset might enable the implementation of more targeted preventive and therapeutic interventions.

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0123

LARGE LANGUAGE MODEL-DERIVED DREAM AFFECT IS A PROSPECTIVE PREDICTOR OF PTSD SYMPTOMS IN HOSPITALIZED TRAUMA PATIENTSHolland Doise¹, Anna K. Quesada¹, Garrett R. Baber¹, Nancy Hamilton¹, Matthew K.P. Gratton¹, Anthony Reffi², Lily Jankowiak³, Gregory Mahr³, David A. Moore², Christopher L. Drake²¹University of Kansas, ²Henry Ford Health System, ³Henry Ford Sleep Research Center

Introduction: Nightmares are associated with more severe post-traumatic stress disorder (PTSD). The advent of large language models (LLM) offers unique advantages to efficiently code affective dream content over human methods, which can be resource intensive and prone to error. This study tested whether dream

affect (DA), measured via self-report, human-rated narrative coding, and LLM scoring, prospectively predicted PTSD symptom severity following traumatic injury.

Methods: Patients (N = 87) recruited from a Level I trauma center in Detroit, MI, following traumatic injury completed surveys during hospitalization (T1), and 1 month (T2), and 2 months (T3) posttrauma. At each timepoint, participants provided a dream report, self-reported DA, and completed measures of PTSD symptom severity, fear of sleep, and insomnia severity. Dream narratives were scored by trained raters using the Disturbing Dream Content Inventory (DDCI) and by an LLM (Gemma 3 [12B]) to estimate negative affect (NA) and arousal. Using bootstrap-estimated regressions, we tested whether affect from dreams reported during hospitalization predicted PTSD severity at 1 and 2 months posttrauma, and whether DA at 1 month predicted PTSD severity at 2 months, adjusting for age, sex, and baseline PTSD, fear of sleep, and insomnia symptoms.

Results: T1 DA showed minimal predictive value for T3 PTSD symptoms (all p s > .12). However, higher Gemma-derived NA at T1 predicted higher PTSD symptoms at T2 ($\beta = 6.03$, $p = .022$), and higher T1 Gemma-derived arousal similarly predicted T2 symptoms ($\beta = 9.86$, $p = .035$). At T2, both Gemma-derived NA ($\beta = 4.63$, $p = .038$) and DDCI Total scores ($\beta = 8.28$, $p = .010$) predicted higher PTSD symptoms at T3. Self-reported DA showed no significant predictive associations.

Conclusion: LLM-derived affect from posttrauma dreams reported during hospitalization forecasted PTSD symptoms one-month posttrauma over and above other psychological risk factors. Interestingly, self-reported and human-coded DA from the hospitalized dreams did not predict later PTSD symptoms. However, one-month posttrauma DA measured by an LLM and by human coders predicted PTSD severity at two-months posttrauma. These findings suggest that dream narratives may carry clinically relevant emotional signals detectable by an LLM and trained human coders.

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0124

LONELINESS PREDICTS PRE-SLEEP AROUSAL IN A COMMUNITY-BASED SAMPLE OF MID-LIFE ADULTS

Jack Cassell¹, Andrea Decker², Francisco Marquez³, Emily Halvorson¹, Amanda Piechota¹, Matthew Cribbet¹

¹University of Alabama, ²Indiana University School of Medicine,

³Greater Los Angeles Veterans Health System

Introduction: Mounting evidence suggests loneliness is associated with poor health outcomes, including poor sleep. Loneliness is hypothesized to trigger implicit vigilance for social threats, potentially contributing to disrupted sleep through psychological, physiological and behavioral processes. Prior work examining pre-sleep arousal (PSA) and loneliness has primarily utilized samples of emerging adults. Thus, the goal of this study was to examine associations between loneliness and sleep diary-based assessments of PSA in a community-based sample of mid-life adults.

Methods: A sample of midlife adults living in the deep south (N=104; Age=51.05±8.50; Female=76.9%) completed demographic measures, and the UCLA Loneliness Scale at a baseline assessment. PSA was assessed with the Pre-Sleep Arousal Scale over seven days with daily sleep diaries. The cognitive and somatic

subscales, along with a combined cognitive and somatic PSA total score were averaged across seven days. Natural log transformations were used to address non-normality of PSA variables. Bivariate correlations were conducted to test associations between loneliness and PSA. Follow-up multiple regression analyses were conducted to test the associations between loneliness and PSA, while accounting for age and sex.

Results: Bivariate correlations revealed a significant positive association between loneliness and PSA. Specifically, loneliness was significantly positively associated with somatic ($p > .05$), cognitive ($p > .001$), and total PSA ($p > .001$). Follow up regression analyses accounting for age and sex revealed a significant positive association between loneliness and total PSA ($b = .006$, $\beta = .296$, $t = 3.172$, $p > .05$, $R^2 = .151$). Further, loneliness was significantly positively associated with both cognitive ($b = .008$, $\beta = .310$, $t = 3.318$, $p > .05$, $R^2 = .153$) and somatic ($b = .004$, $\beta = .221$, $t = 2.326$, $p > .05$, $R^2 = .120$) PSA.

Conclusion: Findings suggested that loneliness was associated with PSA. Specifically, loneliness was associated with cognitive, somatic, and total PSA averaged across seven days of daily sleep diaries. These findings expand upon prior research examining the association between loneliness and poor sleep and highlight the pre-sleep period as a modifiable intervention target.

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0125

SLEEP REACTIVITY PREDICTS SUBJECTIVE BUT NOT ACTIGRAPHY-DERIVED SLEEP DISTURBANCES IN TRAUMA-EXPOSED ADULTS

Christopher McGrory¹, Anthony Reff², Christopher Drake², Edward Pace-Schott³

¹Suffolk University, ²Henry Ford Health System, ³Massachusetts General Hospital

Introduction: Sleep reactivity is a vulnerability to sleep disturbance after stress. Research shows sleep reactivity may be more consistently associated with self-reported rather than actigraphy-derived sleep disturbances in healthy and clinical samples. This “sleep-state misperception” is commonly seen in Posttraumatic Stress Disorder (PTSD), yet it is unknown whether sleep reactivity differentially correlates with subjective versus objective sleep in PTSD. The current study investigated the association between sleep reactivity and sleep disturbances assessed via questionnaires, daily diaries, and actigraphy in trauma-exposed individuals.

Methods: Participants (N= 129) who had experienced a DSM-5 Criterion A trauma in the past two years, but not prior month, and representing the full spectrum of posttraumatic sequelae were studied (65 meeting PTSD criteria, CAPS-5 mean 30.58; 64 sub-threshold, CAPS-5 mean 11.06). In addition to CAPS-5, participants completed the Ford Insomnia Response to Stress Test (FIRST), Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), PSQI-PTSD Addendum (PSQI-PTSD), and 14-days of sleep diaries and actigraphy.

Results: The FIRST correlated with all self-reported sleep measures: ISI ($r = .47$, $p < .001$), PSQI ($r = .29$, $p < .01$), PSQI-PTSD ($r = .31$, $p < .001$), diary sleep efficiency (SE; $r = -.25$, $p < .01$), and sleep onset latency (SOL; $r = .21$, $p < .05$) except diary total sleep time (TST; $p > .05$). The FIRST was not associated with

the corresponding actigraphy-derived sleep parameters ($p > .05$). Controlling for PTSD severity (CAPS-5), the FIRST still predicted ISI ($\beta = .45$, $p = .002$), PSQI ($\beta = .09$, $p = .06$), PSQI-PTSD ($\beta = .12$, $p = .06$), but not diary SE ($\beta = -.17$, $p = .12$) or diary SOL ($\beta = .40$, $p = .16$).

Conclusion: Sleep reactivity was consistently associated with subjective, but not objective, sleep disturbances, suggesting that self-reported sleep reactivity may manifest primarily in perceived sleep difficulties. Alternatively, sleep reactivity may only be associated with actigraphy on nights after participants experience stressors. The FIRST predicted subjective sleep complaints above and beyond PTSD severity, underscoring its value as an index of sleep vulnerability that is distinct from PTSD-related hyperarousal. Findings highlight the importance of assessing both subjective and objective sleep outcomes, as each may capture distinct processes contributing to stress-related sleep problems.

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0126

SUBJECTIVE MEASURES OF HABITUAL SLEEP OUTPERFORM OBJECTIVE MEASURES IN PREDICTING PROSPECTIVE STRESS RESPONSES IN EMERGENCY RESPONDERS

Emerson Larios, Itamar Lerner

University of Texas at San Antonio

Introduction: Emergency responders experience high exposure to traumatic events, yet early predictors of vulnerability versus resilience remain unclear. Although sleep disturbance is common in this profession due to increased stress exposure and disordered sleep, it is unclear whether habitual sleep prior to stress exposure prospectively predicts later stress reactivity. Building on evidence from our recent systematic review that subjective sleep often outperforms objective metrics in predicting psychological outcomes, this ongoing 1.5-year longitudinal study tests whether baseline subjective and objective sleep measures predict stress-related symptoms during the transition from academy training into active duty.

Methods: Fire, EMS, and police recruits completed a 7-night portable EEG assessment at baseline (T1; pre-academy) measuring sleep efficiency (SE%), total sleep time (TST), and REM duration. Subjective sleep was assessed using the Pittsburgh Sleep Quality Index (PSQI). Stress and well-being were evaluated at academy graduation (T2), 6 months into duty (T3), and 12 months into duty (T4), using the Acute Stress Disorder Scale (ASDS), PTSD Checklist for DSM-5 (PCL-5), and Professional Quality of Life Scale (ProQoL). Analyses included participants who reported at least one stressful or traumatic event after baseline. Pearson correlations examined whether T1 sleep predicted average post-baseline stress outcomes across T2–T4.

Results: Baseline subjective sleep quality was the strongest and most consistent predictor of later psychological functioning. Higher PSQI scores (worse subjective sleep) predicted greater acute stress, higher PTSD symptoms, more burnout, and greater secondary traumatic stress across the first year of duty. Among objective metrics, sleep efficiency was selectively associated with higher compassion satisfaction, suggesting a potential resilience marker. Total sleep time and REM duration were not significantly associated with any outcomes. Overall, subjective sleep measures predicted vulnerability to trauma-related symptoms more robustly than objective sleep architecture.

Conclusion: Habitual subjective sleep quality prior to academy training is a significant predictor of later sensitivity to traumatic stress among emergency responders, whereas objective sleep measures show limited predictive value. These findings highlight subjective sleep as an early indicator of risk and support incorporating sleep-based screening to guide preventive interventions during emergency responder training.

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0127

CHARACTERIZING ACTIGRAPHIC SLEEP PROFILES AND THEIR ASSOCIATIONS WITH HEALTH OUTCOMES IN GULF WAR VETERANS

Charity Breneman¹, Nathaniel Allen², Kamila Pollin², Drew Delp¹, Matthew Reinhard²

¹Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., ²War Related Illness and Injury Study Center (WRIISC), Department of Veterans Affairs

Introduction: Gulf War (GW) veterans continue to report chronic health issues, including sleep disturbances, over 30 years post-deployment. While prior research has focused on self-reported sleep symptoms, few studies have examined objective sleep profiles in this population. This study aimed to identify actigraphy-derived sleep patterns and their associations with health outcomes in GW veterans with Gulf War Illness (GWI).

Methods: Data were drawn from a larger randomized clinical trial evaluating integrative health interventions for veterans with GWI. Participants ($N=82$; $\text{Mean Age}=54.1 \pm 7.1$ years, 86.6% male) wore wrist actigraphy devices for ≥ 7 consecutive nights. Sleep parameters (e.g., total sleep time [TST], sleep efficiency [SE], wake after sleep onset [WASO], motor activity, number of awakenings) and variability metrics were extracted. Principal components analysis (PCA) was used to derive actigraphic sleep profiles. These components were correlated with self-reported sleep quality (PSQI), mental and physical health, pain, fatigue, and cognitive function. Multiple regression models examined predictors of each sleep component.

Results: Three principal components (PCs) emerged: PC1: Higher WASO, motor activity, and awakenings (fragmented sleep); PC2: Lower TST and SE (short, inefficient sleep); PC3: Greater variability in sleep timing and duration (irregular sleep). PC1 was positively associated with age and PSQI global scores and negatively associated with physical functioning (VR-36 PCS). PC2 was inversely associated with PSQI sleep quality, while PC3 was positively associated with depressive symptoms (PHQ-9) and negatively associated with mental functioning (VR-36 MCS). Regression models showed PSQI components (e.g., sleep disturbance, latency) significantly predicted objective sleep profiles.

Conclusion: Distinct objective sleep components were identified among GW veterans with GWI, each were associated with different health outcomes. Fragmented and irregular sleep patterns were linked to poorer physical and mental health, while short, inefficient sleep was associated with subjective sleep quality. These findings underscore the importance of multidimensional sleep assessment in providing a more accurate view of sleep health and in determining potential intervention targets in a clinical population of veterans that continue to self-report sleep disturbances 30 years post-deployment.

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0128

EMOTION REGULATION APPROACHES ARE RELATED TO NIGHTMARE FREQUENCY AND NIGHTMARE-RELATED IMPAIRMENT

Andrew Meierotto, Garrett Baber, Nancy Hamilton
University of Kansas

Introduction: Dreaming is theorized to facilitate fear extinction, a type of implicit emotion regulation, whereas nightmares are thought to reflect failures in this regulatory process. However, it is not known whether the frequency of nightmares and associated functional impairment are related to explicit emotion regulation styles. This study examined associations between nightmare experiences and two emotion-regulation strategies, cognitive reappraisal (adaptive reframing of emotional experiences) and expressive suppression (maladaptive inhibition of emotional expression), in a sample of university students.

Methods: Participants were undergraduate students enrolled in an introductory psychology course. They completed a survey assessing nightmare frequency and nightmare-related impairment (Nightmare Disorder Index; NDI), and emotion-regulation strategies (Emotion Regulation Questionnaire). Given the ordered-categorical structure of NDI responses, cumulative link ordinal regression models were used to test whether cognitive reappraisal and expressive suppression predicted higher levels of nightmare frequency and impairment, adjusting for age.

Results: In the model predicting nightmare-related impairment, higher expressive suppression significantly increased the odds of reporting more severe nightmare impairment (OR = 1.14, 95% CI [1.07, 1.23], $p < .001$). Cognitive reappraisal showed a non-significant trend toward reducing nightmare impairment severity (OR = 0.97, 95% CI [0.92, 1.02], $p = .27$). In the model predicting nightmare frequency, higher cognitive reappraisal significantly decreased the odds of reporting more frequent nightmares (OR = 0.96, 95% CI [0.93, 1.00], $p = .025$), whereas expressive suppression did not significantly predict frequency (OR $\approx$ 1.00, $p = .96$). Age was not a significant predictor in either model.

Conclusion: Findings suggest that maladaptive emotional suppression is associated with greater nightmare-related distress, whereas adaptive cognitive reappraisal is modestly associated with fewer nightmares. These preliminary results highlight the relevance of emotion regulation processes in understanding vulnerability to nightmare experiences. Future research using targeted measures, longitudinal designs, and more controlled sampling is needed to clarify underlying mechanisms and strengthen causal inferences.

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0129

PERCEIVED STRESS AND REVENGE BEDTIME PROCRASTINATION IN BLACK ADULTS

Jelaina Shipman-Lacewell, Laura Ward, Brittny James, Samyrah Soua, Mike Thomas, Nia Goodridge, Dayna Johnson
Emory University

Introduction: "Revenge bedtime procrastination", the intentional delay of bedtime to engage in leisure activities or tasks not accomplished during the day, has been increasingly recognized as a contributor to poor sleep health. However, no studies have examined psychosocial factors associated with bedtime procrastination among Black adults, a population disproportionately exposed to psychosocial stressors and at an increased risk for insufficient sleep. In this study, we examined the association between psychosocial stressors and frequent engagement in revenge bedtime procrastination among Black adults.

Methods: We analyzed data from the SLUMBR study, a cross-sectional study examining perceptions, attitudes, and beliefs around sleep practices in Black adults (N= 359, 49% women, aged 18-50). Perceived stress was measured via the Global Perceived Stress Scale (GPSS), which assessed stress in the past 12 months across eight domains: job, relationships, neighborhood, caregiving, legal problems, medical problems, racism/discrimination, and meeting basic needs. The total GPSS score was categorized into tertiles (low, medium, high). For analyses examining individual stressors of the GPSS, responses were dichotomized to no/low stress versus moderate/high stress. Participants responded to a single item assessing how often they participated in bedtime procrastination, which we dichotomized as never/rarely/sometimes versus often/always. Poisson regression models with robust estimators examined the association of perceived stress (total stress and eight stressors) and bedtime procrastination, adjusting for age, sex, income, education, employment, and partner status.

Results: Approximately 34% of participants reported participating in revenge bedtime procrastination often/always. In fully adjusted models, high (vs. low) perceived stress was associated with a greater prevalence of frequent revenge bedtime procrastination (PR: 1.86 CI: 1.16, 2.97). In domain-specific analyses, moderate/high relationship and caregiving stress were associated with increased prevalence of frequent bedtime procrastination (PR: 1.91 CI: [1.30, 2.82]; PR: 1.54 CI: 1.03, 2.30).

Conclusion: High levels of perceived stress were associated with frequent revenge bedtime procrastination. Individuals experiencing moderate/high levels of relationship and caregiving stress were more likely to engage in revenge bedtime procrastination. While cross-sectional, findings suggest that interventions to address revenge bedtime procrastination should consider addressing stressors that may contribute to delaying bedtime.

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0130

SLEEP MORE, SCROLL LESS: THE IMPACT OF SLEEP AND SOCIAL MEDIA ON TEEN MOOD

Olivia Triplett¹, Sherry Wu², Shun Iwata², Lia Galut², Ysabelle Andriou², Andromeda Carver², Kimberly Luu², Aaliyah Peeran², Lauren Smith², Elicia Wartman¹, Katharine Simon²
¹Rady Children's Health, Orange County, ²University of California, Irvine

Introduction: Sleep plays a critical role shaping affect and emotion regulation. Social media use (SMU) may influence this relationship by affecting mood and increasing emotional arousal, particularly when close to bedtime. Conversely, mood may also drive social media engagement, with youth seeking social connection or distraction in response to emotional states. We examined the

bidirectional relationships between pre-sleep social media use, evening mood, and sleep duration.

Methods: Youth aged 9-13 ($N = 51$, $Mage = 11.5$, $SD = 1.6$) completed four quarterly seven-consecutive days of daily sleep diaries, reporting on sleep, hours of social media use, and thrice daily ecological momentary assessments. Four hierarchical moderation models tested bidirectional associations between SMU and positive and negative mood, with sleep duration as a moderator. All models controlled for sex, age, and study week. Composite mood scores were created, and social media use and sleep duration were mean centered.

Results: Longer sleep was associated with higher positive mood, whereas greater pre-sleep SMU predicted lower mood. The negative effect of SMU on mood was slightly stronger with longer amounts of sleep ($p < .01$). Though greater SMU predicted higher negative mood, sleep was not a significant predictor of negative mood. Males reported higher negative mood compared to females, controlling for all other variables ($p < .01$). Higher positive evening mood was associated with lower SMU ($p = 0.001$), and longer sleep was strongly associated with lower SMU ($p < .001$). Higher negative mood also predicted higher SM use ($p < .001$), while longer sleep was strongly associated with lower SM use ($p < .001$). Older teens and males consistently had greater SMU (p 's $< .001$).

Conclusion: Adolescents who slept more reported better positive mood and less SMU, whereas higher SMU was linked to poorer mood. Older teens and males consistently spent more time online, and these associations highlight the impact of sleep and SMU habits on adolescent mood and behavior. Clinically, monitoring sleep patterns and SMU may help identify teens at risk for mood difficulties, and promoting adequate sleep, alongside balanced social media habits, could be key targets for interventions to support emotional well-being.

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0131

EMERGING ADULT SLEEP AND THEIR PARENTS' PARENTING BEHAVIORS: MODERATION BY EMERGING ADULT RELIGIOSITY

Sabrina Atiq, Christina McCrae, Melanie Stearns
University of South Florida

Introduction: Emerging adulthood (18-25 years) is a time of identity exploration and newfound independence. It also increases the risk of sleep problems due to inconsistent schedules, academic stress, and social demands. Parental overprotection, which restricts autonomy and independence, can worsen these challenges by limiting an emerging adult's ability to handle stress and manage emotions. In contrast, religiosity can act as a protective factor, providing support and coping mechanisms that help alleviate the negative impacts of overprotection. Despite this, there is limited research on how religiosity may influence the relationship between parenting behaviors and sleep. Thus, we explored whether emerging adult religiosity moderated the relationship between parenting behaviors and emerging adult trouble sleeping.

Methods: Emerging adults (18-25) completed surveys in an online data collection and reported on their perceptions of their parents' parenting behaviors and their own religiosity and sleep ($N=886$, age $M=22.73$, 60.2% female). Measures included the Parental Bonding Instrument subscales (care, overprotection), Stearns-McKinney Assessment of Religiosity Traits (overall score), and Adult Self Report subscales (trouble sleeping item). PROCESS examined moderation analyses, controlling for age and gender.

Results: Emerging adult religiosity moderated the relationship between maternal overprotection and emerging adult trouble sleeping [$F(1, 873)=7.08$, $p=.008$], such that greater overprotection was associated with greater trouble sleeping among those with intermediate ($t=4.18$, $p<.001$) and highest religiosity ($t=4.34$, $p<.001$). Emerging adult religiosity moderated the relationship between maternal care and emerging adult trouble sleeping [$F(1, 881)=5.12$, $p=.024$], such that greater care was associated with less trouble sleeping among those with lowest ($t=2.16$, $p=.031$), intermediate ($t=6.05$, $p<.001$), and highest religiosity ($t=5.34$, $p<.001$).

Conclusion: Results suggest that parenting behaviors continue to impact children's sleep once they are emerging adults, and that higher religiosity may strengthen the impact of parenting on emerging adult sleep. This may occur because studies have shown that emerging adults who are more religious are often closer to their parents and thus may be more impacted by their parents' behaviors. Future studies should examine whether balancing parental support with autonomy may enhance sleep in EA, particularly those who are religious.

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0132

SLEEP REACTIVITY, SLEEP-RELATED CANNABIS EXPECTANCIES, AND CANNABIS USE AS A SLEEP AID IN TRAUMA-EXPOSED COLLEGE STUDENTS

Grace Seymour, Troy Hubert, Christal Badour
University of Kentucky

Introduction: Sleep reactivity is linked to increased risk of insomnia and trauma-related distress. College students may be at risk of using cannabis as a sleep aid to cope with trauma-related sleep problems, however, no existing studies investigate the role of sleep-related cannabis expectancies and sleep reactivity on cannabis use as a sleep aid.

Methods: The present study evaluated whether either positive or negative sleep-related cannabis expectancies moderated the relation between sleep reactivity and use of cannabis as a sleep aid. 664 college students (83.3% women) aged 18 to 24 ($Mage = 18.98$, $SD = 1.07$) completed self-report measures, including lifetime history of potentially traumatic events (Trauma History Questionnaire; THQ), Sleep Reactivity (Ford Insomnia Response to Stress Test; FIRST), Positive and Negative Sleep Related Cannabis Expectancies (Sleep-Related Cannabis Expectancy Questionnaire (SR-CEQ), PTSD symptoms (PTSD Checklist for DSM-5; PCL-5), and a question about cannabis use as a sleep aid in the past 12 months.

Results: Above and beyond gender and PTSD symptoms, sleep reactivity was positively associated with likelihood of using cannabis as a sleep aid ($OR = 1.04$, $CI = 1.01-1.08$, $p = .01$). Further,

there was an interaction between sleep reactivity and positive sleep-related cannabis expectancies (OR = 1.00, CI = 0.99-1.00, $p = .04$), such that sleep reactivity was associated with higher likelihood of use of cannabis as a sleep aid at low (OR = 1.08, CI = 1.02-1.15, $p = .01$) and moderate (OR = 1.05, CI = 1.01-1.09, $p = .01$) levels of positive cannabis-use expectancies. The relation between sleep reactivity and cannabis use as a sleep aid was non-significant for the top 35.54% of positive sleep-related cannabis expectancy values. There was no significant interaction between sleep reactivity and negative sleep-related cannabis expectancies.

Conclusion: Results indicate that at high levels of positive cannabis-use expectancies, the use of cannabis as a sleep aid may be better explained by factors other than sleep reactivity. College students may benefit from educational resources that address positive beliefs and misconceptions surrounding cannabis use and sleep health.

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0133

SUBJECTIVE SOCIAL CLASS AND SLEEP-RELATED IMPAIRMENT IN YOUNG ADULTS

Jessica Olsen¹, Kearney Smith¹, Jor Grapentine¹, Jessica Dietch¹, Eric Zhou², Tracy Trevorrow³

¹Oregon State University, ²Harvard Medical School, ³Chaminade University of Honolulu

Introduction: Lower objective social class (i.e., socioeconomic position) is associated with poorer sleep health. Emerging evidence suggests that objective measures of social class may not fully capture how college students perceive their social standing and identity, dimensions shaped by social and cultural influences beyond traditional socioeconomic indicators. Subjective social class (SSC), or one's perceived sociocultural standing, may offer additional insight into processes such as sleep-related impairment (SRI), an important marker of sleep-related daytime functioning. We hypothesized that college students of lower social class would report greater SRI compared to those from middle and upper classes.

Methods: College students from two universities (N=1,001; Mean=19.87[2.34], 70% women, 53% white) completed a survey between April 2021 and September 2022. We used a linear regression with SSC (i.e., lower, middle, upper class) as the independent variable, PROMIS SRI as a dependent variable, and race/ethnicity, gender, and university as covariates.

Results: The regression model was statistically significant and accounted for 5% of the variance in SRI ($R^2_{adj}=0.05$ $F(12, 978)=5.53$, $p<.001$). College students who self-reported as belonging to the lower social class reported greater SRI compared to both middle-class ($B=-1.78$, $SE=0.64$, 95% CI[-3.04, -0.52]) and upper-class participants ($B=-1.90$, $SE=0.74$, 95% CI[-3.35, -0.44]).

Conclusion: College students who self-identified as belonging to the lower social class demonstrated greater SRI. Prior work suggests that SSC may be more strongly tied to health outcomes than objective measures. For example, in a sample of 177 healthy

adults, SSC was more strongly associated with sleep duration, daytime sleepiness, and weekend oversleeping compared to objective measures of social class. Mechanisms like emotional regulation and negative affect may regulate how individuals with lower SSC experience SRI. Further examination of these psychological mechanisms is warranted to identify protective factors that mitigate impacts of SRI among individuals with low SSC.

Support (if any):

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0134

THE MODERATING ROLE OF SSRI USE ON THE LINK BETWEEN UNDERGRADUATES' DEPRESSIVE SYMPTOMS AND REM SLEEP DURATION

Jack Peltz¹, Anita Licata¹, Osiris Powley¹, Cassidy Donald¹, Jon Curley¹, Jerome Martindale¹, Faith Walter¹, Jamie Zeitzer²

¹State University of New York at Brockport, ²Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine

Introduction: Introduction: Given that more than 50% of college students report deficient (i.e., short-duration, poor quality) sleep (ACHA, 2023), this population is at significant risk for mental health problems (Gaultney, 2010). Despite robust links between global assessments of sleep (e.g., quality, duration) and psychopathology, recent research has begun to explore more specific sleep indicators (e.g., sleep architecture) and their associations with psychopathology (e.g., depression). Research has focused on links between deficient sleep and negative outcomes via self-report and actigraphy, but these methodologies do not measure the basic properties of sleep characterized through electroencephalography (EEG). Furthermore, sleep EEG measurement has relied on clinic-based polysomnography, which diminishes ecological validity. To extend prior research (e.g., Boon et al., 2025) and address these methodological concerns, this study used ambulatory EEG to examine the dynamic links between undergraduates' daily reports of depressive symptoms and duration of REM sleep, a form of sleep putatively involved in emotional regulation (e.g., Goldstein & Walker, 2014). Given the impact of SSRI use on REM sleep (Armitage, 2000), we further sought to test if SSRI use moderated this link.

Methods: Methods: The sample's (N=156, 77.1% female) mean age was 20.3 years (SD=3.2), and 64.3% of participants were white, with 18.5% Black, 8.3% Hispanic/Latinx, 5.7% Asian/Pacific Islander, and 3.1% multi-racial/"other." Approximately 20% (n=31) reported daily SSRI usage. Sleep architecture and total sleep time (TST) were assessed with the Muse S (Interaxon, Inc.) across 10 consecutive nights. Depressive symptoms (PHQ-2) were self-reported online each evening, and initial depressive symptom levels (PHQ-9) and SSRI usage were assessed at baseline.

Results: Results: Dynamic structural equation modeling (i.e., cross-lagged, multilevel modeling) was conducted in Mplus (v. 8.8, Muthen & Muthen, 2022) and demonstrated significant bidirectional relations between REM sleep duration and depressive symptoms for SSRI users. Although depressive symptoms predicted that night's REM sleep duration across the entire sample, controlling for TST and baseline PHQ-9 levels, decreases in the

previous evening's REM sleep duration predicted increases in the following evening's depressive symptoms only in SSRI users.

Conclusion: Conclusion: Our results highlight the transactional associations between mood and REM sleep and underscores the unique process this takes for SSRI users.

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0135

AI-ESTIMATED EMOTIONAL COMPLEXITY IN DREAMS IS RELATED TO ADAPTIVE SELF-REPORTED DREAM AFFECT DYNAMICS

Lacey Nguyen, Garrett Baber, Nancy Hamilton
University of Kansas

Introduction: Dreaming is theorized to facilitate emotion regulation through processes resembling exposure therapy. Advances in artificial intelligence (AI) now allow researchers to scale dream research by automatically estimating emotional content in dream narratives. However, prospective studies applying sentiment analysis to examine the relationship between dream affect and emotion regulation remain limited. This study used a large language model to test whether AI-measured affective complexity within dream reports is associated with adaptive self-reported within-dream affective shifts.

Methods: Undergraduates ($N = 192$) completed a survey, reporting a recent memorable dream, ratings of corresponding positive and negative dream affect, and reported their dream's affective dynamics (i.e., stayed the same throughout, shifted from negative to positive, shifted from positive to negative, unsure, self-describe). Participants reported posttraumatic stress symptoms (PCL-5-C) and nightmare-related symptoms (NDI). Dream narratives were processed using C-RoBERTa, a validated model estimating dream joy and fear intensity. Binary logistic regressions predicted within-dream affective recovery (negative $\rightarrow$ positive) using C-RoBERTa joy $\times$ fear interaction terms while controlling for trauma and nightmare symptoms.

Results: The C-RoBERTa joy $\times$ fear interaction significantly predicted within-dream affective recovery ($OR = 4.00$, 95% CI [1.53, 14.34], $p = .014$). This effect was stronger than the analogous interaction using self-reported dream affect ($OR = 2.01$, 95% CI [1.08, 3.88], $p = .031$).

Conclusion: AI-estimated affective complexity predicted dreams characterized by negative-to-positive affective shifts, a process theorized to reflect within-dream emotion regulation. These findings support C-RoBERTa as a scalable tool for investigating how dream affect relates to waking psychological functioning.

Support (if any):

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0136

ASSOCIATIONS BETWEEN EXPERIENCES OF RACIAL DISCRIMINATION AND SLEEP HEALTH DURING PREGNANCY

Eileen Condon¹, Rachel Friedlander², William Grobman³, Tera Howard⁴, Andrea Kozai⁵, Carol Major⁶, Nancy Redeker¹, George Saade⁷, Yashika Sharma¹, Arthurine Zakama⁸, Bethany Barone Gibbs⁹

¹Elisabeth DeLuca School of Nursing, University of Connecticut,

²Weill Cornell Medicine, ³Brown University, ⁴Indiana University School of Medicine, ⁵University of Pittsburgh, ⁶UCI Health,

⁷Eastern Virginia Medical School, Old Dominion University,

⁸University of Utah, ⁹West Virginia University

Introduction: Racial discrimination is associated with poorer sleep health in non-pregnant adults. However, the relationship between experiences of discrimination and antenatal sleep health remains poorly understood. We aimed to evaluate associations between experiences of discrimination and sleep health during pregnancy, as measured both by self-report and actigraphy.

Methods: We conducted a secondary analysis of the nuMoM2b pregnancy cohort. Participants completed the Experiences of Discrimination Scale, the Women's Health Initiative Insomnia Rating Scale (WHIIRS), and the Epworth Sleepiness Scale (ESS). A subset ($n=658$) also completed 7 days of wrist actigraphy. We evaluated sleep health using six continuous measures based on the AHA Multidimensional Sleep Health framework: sleep regularity, alertness, timing, efficiency, duration, and insomnia. We also created a sleep health composite score by dichotomizing sleep domains using established cutoffs (0=did not meet cutoff; 1=met cutoff): sleep regularity (midpoint SD ≤ 60 minutes), alertness (ESS score ≤ 10), timing (midpoint 2-4AM), efficiency (sleep efficiency $\geq 85\%$), duration (≥ 7 hours), and lack of insomnia symptoms (WHIIRS ≤ 9). These domains were then summed to create a composite score ranging from 0 to 6 (higher=more favorable sleep health). We used linear regression to examine associations between experiences of discrimination and each continuous sleep health variable and the composite sleep score.

Results: The sample included 8,718 pregnant people (61% non-Hispanic White, 16.4% Hispanic, 13% non-Hispanic Black, 4% Asian; 30% living $< 200\%$ of the federal poverty level). Most (76%) reported no experiences of discrimination, 17% reported 1-to-2 experiences, and 7% reported ≥ 3 experiences. Discrimination was reported more commonly by Asian (49%), Black (42%), and Hispanic (34%) people compared to non-Hispanic white (13%) people ($p<.0001$). Experiences of discrimination were associated with higher WHIIRS insomnia scores ($\square=.05$, $p<.0001$), more daytime sleepiness ($\square=.06$, $p<.0001$), more sleep fragmentation ($\square=.16$, $p<.0001$), and worse sleep efficiency ($\square=-.13$, $p=.0008$), but not sleep duration or midpoint. Experiences of discrimination were also associated with lower (i.e. less favorable) composite sleep scores ($\square=-.18$, $p<.0001$).

Conclusion: Experiences of discrimination may be an important social determinant of sleep health among pregnant people. Research could evaluate whether interventions to mitigate the harmful effects of discrimination may promote better sleep health among pregnant women.

Support (if any): NHLBI/NICHD

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0137

COGNITIVE AND SOMATIC PRE-SLEEP AROUSAL ARE ASSOCIATED WITH FEAR OF SLEEP IN ACUTE TRAUMA PATIENTS

Elizabeth Bolen¹, Anthony Reffi², Elle Wernet², David Gessert², Syed Jaffery², David Moore², Christopher Drake²

¹Henry Ford Sleep Research, ²Henry Ford Health System

Introduction: Trauma-exposed individuals with PTSD may develop a fear of sleep (FoS). FoS is defined as a fear of being vulnerable during sleep and is accompanied by elevated pre-sleep arousal. Pre-sleep arousal is classified into two subscales

– cognitive, the psychological response such as depressing or anxious thoughts, and somatic, the physiological response such as increased heart rate and shortness of breath. However, it is unclear if FoS is driven by overall pre-sleep arousal or predominantly cognitive or somatic arousal specifically. We investigated whether cognitive and somatic pre-sleep arousal independently predict fear of sleep among patients hospitalized following traumatic injury.

Methods: We recruited patients hospitalized in a Level I trauma center in Detroit, Michigan, following traumatic injury ($N = 88$, $\text{Mage} = 39.53 \pm 14.31$, 67.0% male, 67.0% Black). Patients completed the Pre-sleep Arousal Scale (PSAS) and the Fear of Sleep Inventory (FoSI) Short Form during hospitalization. The FoSI queried patients about their fear of sleep over the past 30 days (e.g., “I felt that it was dangerous to fall asleep”). We conducted a hierarchical regression to assess the independent relationship between each PSAS subscale and FoS.

Results: Our sample had a FoS mean score of 8.56 ($SD=9.48$) of a maximum score of 52. Our sample had a cognitive mean score of 15.49 ($SD=7.46$) of a maximum score of 40, and a somatic mean score 21.17 ($SD=9.10$). Our sample had higher cognitive than somatic arousal ($t=7.87, p<.001$). Cognitive and somatic subscales were highly correlated ($r=.68, p<.001$). In a linear regression, both cognitive ($\beta=0.45$, 95% CI [0.21, 0.69], $p<.001$) and somatic ($\beta=0.23$, 95% CI [-0.05, 0.52], $p<.05$) subscales independently predicted FoS and the model explained 41% of the variance.

Conclusion: Both cognitive and somatic arousal before sleep are uniquely associated with fear of sleep among acute trauma patients hospitalized in a Level I trauma center. These findings suggest that treatment may not need to target a specific type of arousal at bedtime. Instead, interventions aimed at reducing pre-sleep cognitive arousal, such as mindfulness, or pre-sleep somatic arousal, such as relaxation, may both help ameliorate fear of sleep in acute trauma patients.

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0138

DISCREPANCY BETWEEN SUBJECTIVE AND OBJECTIVE MEASURES OF HABITUAL SLEEP IN VETERANS WITH GULF WAR ILLNESS

Charity Breneman¹, Nathaniel Allen², Kamila Pollin², Matthew Reinhard²

¹Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., ²War Related Illness and Injury Study Center (WRIISC), Department of Veterans Affairs

Introduction: Even though there is variability in symptom presentation, fatigue and sleep disturbance are commonly reported by veterans with Gulf War Illness (GWI), with deployed veterans reporting greater symptom burden. Discrepancies have been found between self-report and objective measures of sleep in clinical populations, however, this has yet to be examined in veterans with GWI. This analysis examined the associations between sleep discrepancy and self-reported measures of health in veterans with GWI.

Methods: In a sample of 85 veterans with GWI ($\text{Mage}=54.2 \pm 7.1y$, 87.1% male), objective sleep was assessed over a seven-day period using wrist-worn actigraphy and subjective habitual sleep was assessed using the Pittsburgh Sleep Quality Index (PSQI). Actigraphy data were manually scored and averaged across the seven nights to derive habitual measures of objective sleep parameters that are available on the PSQI: total sleep time (TST), sleep onset latency (SOL), and sleep efficiency (SE). Global sleep discrepancy was calculated as an index for TST ($[\text{objective TST} - \text{subjective TST}] / \text{objective TST}$) and difference scores for SOL and SE (objective – subjective). Participants completed a series of questionnaires to assess symptoms of depression, posttraumatic stress disorder (PTSD), and GWI as well as fatigue, pain, cognitive difficulties, and stress. Correlation analysis was conducted to examine associations between measures of global sleep discrepancy and self-reported measures of health.

Results: The majority of the participants underestimated SOL (55.3%) and overestimated SE (68.8%) on the PSQI relative to actigraphy. Correlation analyses revealed that global sleep discrepancy in TST was associated with fatigue and GWI gastrointestinal symptoms ($p < 0.05$). For SOL, global sleep discrepancy was associated with fatigue, stress, cognitive difficulties, hyperarousal PTSD symptoms, and GWI symptoms ($p < 0.05$). No associations were observed for global sleep discrepancy in SE.

Conclusion: Discrepancies between subjective and objective measures of habitual sleep were observed in veterans with GWI, and were found to be associated with several self-reported measures of health, thus emphasizing the importance of measuring the multidimensionality of sleep. Additional research is needed to investigate the implications of sleep discrepancy among veterans with GWI.

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0139

DO COGNITIVE-AFFECTIVE PROCESSES MODERATE THE RELATIONSHIP BETWEEN SLEEP REACTIVITY AND DEPRESSIVE SYMPTOMS?

Emma Janes¹, Ivan Vargas¹, Arash Assar¹, Mara Egeler¹, Veronica Floyd², Harrison Dickens², Jamie Walker²

¹University of Notre Dame, ²University of Arkansas

Introduction: An established bidirectional link exists between insomnia and depressive symptoms. In addition, sleep reactivity, a vulnerability for stress-related sleep disturbance, has been shown to predict depressive symptoms independently of insomnia. However, the mechanisms underlying the relationship between sleep reactivity and depressive symptoms remain unexplored. This study aimed to determine the roles of cognitive-affective processes, such as rumination, suppression, and cognitive reappraisal, in influencing the relationship between sleep reactivity and depressive symptoms.

Methods: Cross-sectional data were collected via an online Qualtrics survey from 641 undergraduate students at the University of Arkansas ($\text{Mage}=19.1$ years, 68% female, 80% White).

Eighty-three participants were excluded due to substantial missing data (final $N = 558$), and multiple imputation was used to correct for missing data. Participants completed measures of depression and anhedonia symptoms (MASQ-90), perceived stress (PSS-10), insomnia symptoms (ISI), sleep reactivity (FIRST), cognitive reappraisal and suppression (ERQ), and rumination (RRS-22). Two 3-step hierarchical multiple regressions were performed to determine whether cognitive-affective processes (rumination, suppression, cognitive reappraisal) –including their interactions with sleep reactivity– accounted for additional variance in depressive and anhedonic symptoms beyond insomnia symptoms and perceived stress.

Results: Our findings suggest that all variables had a significant main effect on depressive symptoms, however, only rumination significantly moderated the link between sleep reactivity and depression symptoms ($B = .008$, $t(548) = 2.75$, $p < .01$). That is, the association between sleep reactivity and depressive symptoms was greater among those with greater ruminative tendencies. The two-way interactions for suppression and cognitive reappraisal were not significant, indicating that these processes did not moderate the sleep reactivity-depression link. No cognitive-affective process significantly predicted the relationship between sleep reactivity and anhedonic symptoms.

Conclusion: As expected, our findings supported that rumination, suppression, and cognitive reappraisal individually predict depressive symptoms. Additionally, the association between sleep reactivity and depressive symptoms was greater for individuals with greater ruminative tendencies. No cognitive-affective process was found to significantly impact the relationship between sleep reactivity and anhedonic symptoms.

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0140

DOES TRAIT ANXIETY ACT AS A MODERATOR BETWEEN SLEEP AND DAILY SOCIAL EMOTIONS?

Erica Steinberg, Linying Ji, Maurine Lockwood, Jessica Smith, Cara Palmer

Montana State University

Introduction: Poor sleep predicts the onset and maintenance of mental health difficulties, which may be due to the impact of sleep on emotional experiences. Results suggest that disrupted sleep increases negative and decreases positive emotions. Further, sleep difficulties also impair social interactions, but little is known about the relationship between sleep and social emotions, and how individual differences such as trait anxiety may exacerbate these associations.

Methods: Participants included 168 adults (72% female), with a final analytic sample of 115. Participants completed an intake where they completed the State-Trait Anxiety Inventory, followed by two weeks of actigraphy. Participants completed nightly surveys about their socially-oriented emotional experiences each day, including feelings of Positive Resonance (PR; e.g., reports of shared positive affect and feeling ‘in sync’ with others; Fredrickson, 2016), along with specific social emotions, including positive connectedness (e.g., gratitude, love), interpersonal aggression

(e.g., hostility), jealousy, self-consciousness (e.g., embarrassed, awkward), and social exclusion (e.g., ignored, excluded).

Results: Later bedtimes were associated with more interpersonal aggression, $r(112) = .20$, $p = .04$. Greater WASO was related to less PR, $r(115) = -.18$, $p < .05$. Longer SOL was also related to less PR, $r(78) = -.28$, $p = .014$, and less positive connectedness, $r(78) = -.22$, $p < .05$. Trait anxiety was associated with all of the social emotions (less PR and connectedness, greater interpersonal aggression, jealousy, self-consciousness, and social exclusion; all p 's $< .001$) and to a later average bedtime, $r(114) = .25$, $p = .007$. However, anxiety did not moderate any of the associations between sleep and social emotions.

Conclusion: This study expands prior research by examining how sleep relates to positive and negative emotions in social contexts. Later bedtimes were associated with daily experiences of interpersonal aggression, such as feelings of hostility or annoyance toward others. Difficulties falling asleep and staying asleep were associated with fewer daily positive social experiences, but not with negative social emotions. These findings were robust regardless of trait levels of anxiety.

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0141

EMOTION REGULATION AMONG INDIVIDUALS WITH CHRONIC NOR EXPERIMENTALLY INDUCED SLEEP LOSS: PRELIMINARY FINDINGS

Shengzi Zeng, Seo Ho Song, Tony Cunningham

Beth Israel Deaconess Medical Center

Introduction: Sleep disruption has been linked to heightened emotional reactivity and difficulties with emotion regulation. By comparing healthy individuals under normal or restricted sleep with patients diagnosed with insomnia disorder, this study aims to examine how experimentally induced sleep restriction and chronic clinical sleep disturbance influence subjective emotional responses during the use of maintain, suppression, and reappraisal strategies.

Methods: Seventeen healthy controls completed a normal sleep protocol containing two-night 8.5-h sleep opportunity at hospital separated by two-night at-home sleep (HCNS), while another 17 healthy adults underwent a sleep-restriction protocol in which their bedtime was limited to four hours per night for three consecutive nights in hospital settings (HCSR). Ten individuals with insomnia disorder (ID) followed the same normal-sleep protocol as the HCNS group. Following sleep manipulation, all participants completed an emotion regulation task in which they were instructed to maintain, suppress, or reappraise their emotional responses to 60 aversive images. Emotional intensity was obtained on a scale from 1 (neutral/calm) to 4 (negative/aroused).

Results: Preliminary analyses revealed a significant main effect of Condition (maintain vs. suppress vs. reappraise), $p < .001$. Pairwise comparisons indicated that emotional intensity ratings were highest for maintained images, followed by suppressed and then reappraised images, reflecting effective engagement of emotion regulation strategies. Furthermore, a significant Group $\times$ Condition interaction was observed ($p < .001$). In both the

HCNS and ID groups, the expected pattern across Condition was preserved, whereas in the HCSR group, emotional intensity ratings for maintain and suppress conditions did not differ significantly ($p = 0.834$). Although not statistically significant ($p < 0.158$), ID tended to report higher emotional intensity under the maintain condition compared with both healthy groups.

Conclusion: Preliminary findings indicate that emotion regulation strategies effectively modulate subjective emotional intensity, with reappraisal producing the greatest reduction across groups. However, the pattern differed by sleep condition: while HCNS and ID showed the expected gradient across strategies, HCSR appeared to blunt differences between maintaining and suppressing emotional responses. More definitive conclusions will be drawn as data collection progresses.

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0142

IS THE SLEEP-MOOD LINK UNIVERSAL? PATH ANALYSES OF HOW ANXIETY, DEPRESSION, AND EMOTION REGULATION INFLUENCE THE SLEEP-MOOD RELATIONSHIP

Kaiqi Zhang, Jeffrey Bedwell
University of Central Florida

Introduction: Previous research has established that sleep quality is closely linked to affect and stress. However, fewer studies distinguish its unique associations with negative affect (NA), positive affect (PA), and perceived stress (PS). Furthermore, how these relationships differ for people with depressive and anxiety disorders and those using different emotion regulation strategies is understudied.

Methods: We conducted four separate path analyses, with sleep quality as the predictor, NA, PA, and PS levels as outcomes, and one moderator per path analysis: self-reported past-year diagnoses of depression and anxiety, and levels of suppression/reappraisal emotion regulation strategies. We collected an online survey that included: the Pittsburgh Sleep Quality Index, Positive and Negative Affect Schedule, Perceived Stress Scale, Emotion Regulation Questionnaire, and self-reported depression and anxiety disorder diagnoses. After exclusions, data from 720 undergraduates (mean age = 21.10; 67% female) were analyzed ($N = 510$ for Emotion Regulation Questionnaire).

Results: Without moderators, poorer sleep quality predicted higher NA, lower PA, and higher PS ($ps < .001$). Moderation analyses revealed that having depressive ($\beta = -.106, p = .010$) and/or anxiety disorder diagnoses ($\beta = -.136, p = .002$) weakened the relationship between sleep quality and PS. Higher use of suppression predicted higher NA and PS and lower PA, while higher use of reappraisal predicted lower NA and PS and higher PA. Higher use of suppression weakened the relationship between sleep quality and PA ($\beta = .097, p = .028$).

Conclusion: While poorer sleep quality was associated with higher PS, the strength of this relationship was significantly weaker for people with past-year depressive and/or anxiety disorders. Similarly, while poorer sleep quality was associated with

lower PA, the strength was significantly weaker for people who use greater suppression as an emotion regulation strategy. Depression, anxiety, and suppression are all closely associated with affect and stress, suggesting that they explain more variance in NA, PA, and PS, leaving less additional variance for sleep quality to account for. These findings highlight the importance of sleep for affect and stress and the need for future research on the unique interaction of sleep, psychopathology, and emotion regulation.

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0143

SLEEP EARLY OR SLEEP WELL? AN SEM ANALYSIS OF THE UNIQUE CONTRIBUTIONS OF SLEEP QUALITY AND CIRCADIAN RHYTHM TO AFFECT AND STRESS

Kaiqi Zhang
University of Central Florida

Introduction: Sleep quality and circadian rhythm are both linked to emotional well-being: poorer sleep quality and an evening-type circadian rhythm each relate to higher negative affect and stress, and lower positive affect. However, most such studies examine only one pathway at a time and do not parcel out the unique associations of each path. Circadian rhythm is a related but separate construct in sleep research, but its unique contribution to affect and stress after controlling for shared variance with sleep quality remains understudied. Examining these constructs within a single analytical framework clarifies their unique associations.

Methods: We collected online survey responses from undergraduates using the Pittsburgh Sleep Quality Index (PSQI), Morningness-Eveningness Questionnaire (MEQ), Positive and Negative Affective Schedule (PANAS), and Perceived Stress Scale (PSS). The final sample included 720 participants (mean age = 21.1, 67% female). We conducted structural equation modeling (SEM) with sleep quality and circadian rhythm as predictors and positive affect (PA), negative affect (NA), and perceived stress (PS) as outcomes. We used item-to-construct balancing (using item factor loadings from separate confirmatory factor analyses [CFA]) to create item parcels as indicators for the latent variables PA (from the PANAS PA subscale), NA (from the PANAS NA subscale), PS (from PSS), and circadian rhythm (from MEQ). We used the PSQI subscales as indicators for the latent variable sleep quality.

Results: SEM analysis revealed that sleep quality was significantly associated with PA ($\beta = -.300, p < .001$), NA ($\beta = .431, p < .001$), and PS ($\beta = .424, p < .001$). Circadian rhythm was significantly associated with PA ($\beta = .168, p < .001$) and PS ($\beta = -.132, p = .005$) but not NA ($\beta = -.061, p = .218$). Analyses of CFA models demonstrating discriminant validity will also be included in the poster.

Conclusion: Poorer sleep quality uniquely predicted lower PA, higher NA, and higher PS. Although evening-type circadian rhythm predicted lower PA and higher PS, its associations were weaker after controlling for shared variance with sleep quality, and it was not associated with NA. Our findings suggest the relative importance of quality over chronotype differences.

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0144

SLEEP AND DAILY POSITIVE SOCIAL AND NON-SOCIAL EMOTIONS AND EMOTION REGULATIONCara Palmer¹, Joanne Bower², Tyler Hilliard¹, Jessica Smith¹, Giovanni Alvarado¹, Erica Steinberg¹¹Montana State University, ²University of East Anglia

Introduction: Sleep difficulties share an intimate connection with mental health disorders, partly due to the impact of sleep on daytime socioemotional experiences (Palmer et al., 2018). A recent meta-analysis suggests that sleep has the largest effect on positive affect when compared to other types of emotional experiences (Palmer et al., 2024), and may blunt positive emotions within both social and non-social contexts (Palmer et al., 2023). However, it is still not clear how sleep is related to specific types of positive emotional experiences, or the emotion regulation of these positive emotions.

Methods: Participants included 168 young adults (72% female) who completed an intake assessment, two weeks of actigraphy, and daily dairies. Participants reported on their daily experiences of low arousal (calm, relaxed, and serene) and high arousal (excited, elated, enthusiastic) positive affect and their positive emotion regulation (i.e., strategies to up-regulate positive affect). Participants also reported on daily experiences of positive emotions during their social interactions that day (e.g., gratitude, compassion, love).

Results: Later bedtimes, sleep timing irregularity (adjusting for average sleep timing), and longer sleep onset latency were all associated with less low arousal positive emotions (r 's $> -.24$ to $-.22$, p 's $< .03$). Irregularity was associated with less frequent use of positive emotion regulation strategies ($r = -.30$, $p = .001$). Longer sleep onset latency and irregularity were also associated with fewer positive social emotions (r 's $= -.22$ to $-.20$, p 's $< .03$). Later bedtimes predicted fewer social emotions, but effects were moderated by sex ($p = .04$), with the strongest effects for males. Sex also moderated the effect of wake after sleep onset ($p = .04$). Greater WASO was related to fewer positive social emotions, but only for females.

Conclusion: These findings support prior research on sleep and positive emotional experiences, and expands this work by examining both low and high arousal emotions, socially-oriented positive emotions, and positive emotion regulation. Sleep was associated with low arousal positive experiences (e.g., feeling calm and relaxed), but not high arousal, and the regulation of positive emotions. Sex may be important to consider when examining sleep and socially-oriented emotional experiences.

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0145

SLEEP AS AN AVOIDANT EMOTION REGULATION STRATEGYMika Hirata¹, Nishka Gupta², Rebecca Campbell²¹Henry Ford Health, ²Bowling Green State University

Introduction: Avoidance is an emotion regulation strategy involving escape from unwanted stimuli (Ottenbreit & Dobson, 2003) and is a core feature in psychiatric disorders (Pineles et al., 2015). Sleep, as a state involving unawareness of one's surroundings, may serve as avoidance but remains unstudied. Understanding sleep as avoidance can identify maladaptive coping patterns that may contribute to sleep dysregulation and maintenance of psychopathology. This preliminary investigation identifies ways young adults may use sleep to avoid.

Methods: 108 young (age = 19.2, SD = 1.43), primarily White ($n = 93$), women ($n = 57$) undergraduates were asked "reasons you may go to sleep even when you are not sleepy" followed by 12 Likert scale items (0 = never to 5 = all the time). Open-ended responses reviewed for themes.

Results: Participants reported the following often: sick ($m = 2.96$, SD = 1.67), bored ($m = 2.11$, SD = 1.49), stress ($m = 1.91$, SD = 1.62), overwhelmed ($m = 1.78$, SD = 1.56), sad ($m = 1.86$, SD = 1.53), lonely ($m = 1.44$, SD = 1.42), anxious ($m = 1.43$, SD = 1.36), work or school responsibilities ($m = 1.19$, SD = 1.27), talking ($m = 1.0$, SD = 1.31). While the following were minimally endorsed: hungry ($m = 0.91$, SD = 1.15), thirsty ($m = 0.60$, SD = 1.11), and sexual arousal ($m = 0.54$, SD = 1.01). Themes included Preparation ($n = 8$; e.g. "to stay up late that night"), Recovery ($n = 7$; e.g. "recover from athletic related activities"), Weather, ($n = 3$; e.g. "weather outside"), Bad Day ($n = 2$; e.g. "... having a bad day so I can get to the next one"), and Passive Suicidality ($n = 1$; "just do not want to exist").

Conclusion: Limited diversity may have lowered the likelihood of certain endorsements such as "Sleep for dinner," a concept related to food insecurity, (Forcone, 2018). Synonymous entries to the Likert scale items suggest the need to rephrase items. Overall, undergraduates appear to use sleep to avoid, though further investigation is needed.

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0146

THE IMPACT OF POLITICAL VIOLENCE ON POPULATION SLEEP HEALTH IN THE UNITED STATES: A REPRESENTATIVE SURVEY FROM NATIONAL SLEEP FOUNDATION

Joseph Dzierzewski, John Lopos

National Sleep Foundation

Introduction: Research supporting public sleep health and safety increasingly considers the effects of far-reaching and pivotal health, economic, cultural, and societal trends and events. Large-scale sociopolitical events, such as political violence, may adversely affect sleep health. However, most prior research has focused on civil protests or countries with high rates of political violence. The present study examined the impact of political violence on sleep in the United States in 2025, with attention to demographic differences and sleep outcomes.

Methods: The National Sleep Foundation conducted a survey of a random, nationally representative sample of 1,448 American adults. The survey, administered in English or Spanish by Ipsos

Public Affairs through its KnowledgePanel®, included: (1) demographic information (age, sex, race/ethnicity, education, marital status, employment status, and household composition), (2) items assessing sleep duration and quality (rated from 1 = excellent to 5 = poor) from the Sleep Health Index, and (3) a single item asking, “Has political violence in the United States had a negative impact on your sleep?” Data collection occurred between September 17 and October 5, 2025.

Results: More than 36% of U.S. adults reported that political violence negatively impacted their sleep. Significant group differences were observed across sex, education, and marital status, with significantly more women ($\chi^2 = 8.41$, $p < .01$), more college educated individuals ($\chi^2 = 15.96$, $p < .001$), and less married adults ($\chi^2 = 8.76$, $p < .001$) reporting a negative impact of political violence on their sleep. Adults who reported negative sleep impacts from political violence also reported poorer sleep quality ($M = 3.22$, $SD = 0.97$) compared to those who did not ($M = 3.00$, $SD = 1.06$), $t(1446) = 3.92$, $p < .001$.

Conclusion: Major sociopolitical events can adversely affect sleep health, with certain demographic groups more vulnerable to these effects. More than one in three U.S. adults reported that political violence negatively impacted their sleep. Future research is needed to clarify the widespread consequences of disruptive and potentially deleterious large-scale societal events, including violent sociopolitical events, and to identify strategies for mitigating their impact on sleep health.

Support (if any):

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0147

THE MODERATING ROLE OF REST-ACTIVITY RHYTHMS IN EARLY PTSD SYMPTOMS AFTER HOSPITALIZATION FOR A STROKE/TRANSIENT ISCHEMIC ATTACK

Maia ten Brink, Talea Cornelius, Donald Edmondson, Ian Kronish, Ari Shechter, Jeffrey Birk
Columbia University Irving Medical Center

Introduction: Posttraumatic stress disorder (PTSD) symptoms are common after stroke/transient ischemic attack (TIA), and post-stroke distress is related to worse functional recovery and shorter sleep. Hospitalization and early recovery are marked by less differentiation between active and rest periods, but the role of rest-activity rhythms in subsequent PTSD remains unclear. We examined whether more robust rest-activity rhythms were related to less severe PTSD symptoms and whether they weakened the association between acute in-hospital distress and later PTSD.

Methods: Patients admitted to the hospital with stroke/TIA symptoms completed the Acute Stress Disorder Scale (ASDS) in-hospital and wore GENEActiv wrist accelerometers for up to 45 days ($N = 394$, 58.3% female). PTSD symptoms were assessed 1 month post-discharge using the PTSD Checklist for DSM-5 (0–80), keyed to their medical event. We derived relative amplitude (RA) from raw accelerometry in participants with ≥ 5 days of ≥ 18 hours/day of valid wear ($M[SD] = 30.8[8.9]$ days). RA reflects the average contrast in activity between the least active 5 and

most active 10 hours; higher (0–1) indicates more robust rhythms. Linear regressions tested associations between RA and 1-month PTSD symptoms, adjusting for ASDS to account for initial distress, and then additionally controlling for age, sex, stroke severity (NIH Stroke Scale), discharge location (home vs. inpatient rehab/other), and medical comorbidities (Charlson Comorbidity Index). We also tested whether RA moderated the prospective influence of ASDS on later PTSD with and without covariates.

Results: Higher RA was associated with lower 1-month PTSD symptoms, $\beta = -1.46$, $p = .02$, adjusting for ASDS. RA also moderated the prospective link from ASDS to PTSD: 1 SD higher RA attenuated PTSD symptoms by 1.93 points ($p < .01$), and this interaction effect persisted when all covariates were included ($\beta = -2.05$, $p < .01$). No covariates independently related to PTSD symptoms.

Conclusion: Less robust rest-activity rhythms early after hospitalization for suspected stroke are related to greater early PTSD symptoms and may amplify the impact of initial distress. Interventions enhancing rest-activity rhythms (e.g., light therapy, consistent routines) may reduce PTSD risk following medical events. Ongoing work will test whether these patterns persist at 6 months post-discharge.

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0148

NON-INVASIVE DEEP BRAIN NEUROMODULATION TO ENHANCE REM SLEEP FOR TRAUMA ADAPTATION

Sujasha Gupta¹, Cameron Good², Antony Passaro², Ehsan Dadgar-Kiani², Herman Morris¹, Angeliki Pollatou³, Lillian Skeiky¹, Eduardo Castillon¹, Alexis Robinson¹, Caitlin Jones¹, Elizabeth Metzger⁴, John Werner¹

¹Uniformed Services University, ²Attune Neurosciences, ³Walter Reed National Military Medical Center, ⁴Geneva Foundation/Uniformed Services University

Introduction: Service members (SMs) experience disproportionately high rates of post-traumatic stress disorder (PTSD), often arising after emotional trauma or delayed neuropsychiatric effects of mild traumatic brain injury (mTBI). Chronic disruption of Rapid Eye Movement (REM) sleep is a hallmark of both conditions, reducing the brain’s ability to downregulate negative emotional memories. REM disturbances are closely tied to hyperarousal, abnormal noradrenergic tone, and persistent consolidation of traumatic memories. There is a critical need for non-pharmacologic tools that can restore healthy REM sleep in this population.

Methods: This study evaluates a novel, wearable low-intensity focused ultrasound (LIFU) device designed to modulate deep brain structures non-invasively. We target two REM-regulatory nuclei, the basolateral amygdala (BLA) and centromedian thalamus (CMT), given their roles in REM initiation, maintenance, emotional salience, and hyperarousal control. Participants completed three overnight polysomnography sessions in a randomized crossover design (sham, BLA-targeted, CMT-targeted). LIFU was delivered in closed-loop fashion during sleep using custom

detection algorithms. Urine samples were collected before bed and upon waking. A multimodal framework quantifies neuro-modulatory effects across: Sleep: architecture, REM percentage and stability, slow-wave density, spindle counts. Neurophysiology: REM-related theta power and aperiodic EEG markers of excitation-inhibition balance. Autonomic function: heart rate and heart rate variability. Molecular biomarkers: urinary noradrenaline and dopamine as indices of noradrenergic state.

Results: LIFU stimulation of the BLA/CMT is expected to: • Increase REM percentage, duration, and stability, and enhance slow-wave density. • Boost REM-related theta activity and steepen the aperiodic EEG slope. • Shift autonomic physiology toward parasympathetic dominance (higher HRV). • Reduce urinary noradrenaline, reflecting decreased hyperarousal and improved emotional memory regulation. These convergent changes are expected to yield a more restorative REM profile. Data collection and analysis are ongoing, with completion anticipated by February 2026.

Conclusion: By precisely targeting deep REM-regulatory circuits, wearable LIFU may provide a deployable, non-pharmacologic intervention to mitigate PTSD- and mTBI-related sleep pathology in SMs, improving readiness and long-term brain health.

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0149

ADVERSE CHILDHOOD EXPERIENCES AND PSG MEASURED PHYSIOLOGICAL HYPERAROUSAL DURING SLEEP

Darlynn Rojo-Wissar¹, Hatty Lara², Melissa Nevarez-Brewster³, Julia Weinman⁴, Jeongwi An⁴, Matthew Reid⁴, Michael Smith⁴

¹Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²Department of Psychology, University of Arizona, ³Department of Psychology, University of Denver, ⁴Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine

Introduction: Adverse Childhood Experiences (ACEs) are robustly associated with poorer subjective sleep quality and trouble falling and staying asleep, with elevated nocturnal hyperarousal proposed as a key mechanism. Hyperarousal is a state of heightened physiological activation that can disrupt restorative sleep and increase the risk of developing long-term health issues. However, empirical studies examining the links between ACEs and objective measures of nighttime hyperarousal are lacking. To address this gap, we examined associations between cumulative ACE exposure and polysomnography (PSG) derived measures of hyperarousal during sleep among a nonclinical sample of adults.

Methods: Participants were 54 healthy adults aged 18 to 47 (59% female; 40% white, 25% Black, 17.31% Asian, 17.31% Other). Annual household income ranged from ≤\$34,999 (32.65%) to ≥\$75,000 (32.65%). At their first visit, participants completed the revised ACE survey, reporting exposure to 18 different types

of adversity before the age of 18, such as abuse, neglect, and household dysfunction. At a separate visit, physiological hyperarousal indicators (sleep onset latency [SOL], wake after sleep onset [WASO], sleep efficiency [SE], arousal index, and the mean and standard deviation of heart rate (HR) during sleep) were derived from a single night of in-lab PSG. Regression models controlling for age, sex, income, and race/ethnicity were used to examine associations between revised ACE score and each hyperarousal indicator.

Results: Each unit increase in ACE score was associated with a 2.38 unit increase in average HR during sleep (standard error [SE]=0.79, $p=.005$), and a 1.30 unit increase in the arousal index during sleep (SE=0.47, $p=.009$). ACEs were not significantly associated with SOL, WASO, SE, or the standard deviation of HR during sleep.

Conclusion: Even among healthy adults free from mental or physical health issues, including sleep problems, ACEs are linked to objective markers of nocturnal hyperarousal. Future prospective studies should examine whether elevated nocturnal hyperarousal mediates associations between ACEs and the later development of poor health outcomes, including among adults who are initially healthy.

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0150

ASSOCIATIONS BETWEEN ADVERSE CHILDHOOD EXPERIENCES AND DAILY SLEEP REACTIVITY IN A NATIONAL SAMPLE OF MIDLIFE ADULTS

Janice Goris Garcia, Danica Slavish
University of North Texas

Introduction: Adverse childhood experiences (ACEs) are common and linked to poorer sleep health and altered stress responses in adulthood. However, pathways connecting early adversity to sleep disruption remain unclear. Sleep reactivity—the propensity for stress to disrupt sleep—may be a key vulnerability factor shaped by both trait predispositions and stress exposure. A few studies have examined associations between ACEs and sleep reactivity, but these have relied on retrospective measures. To our knowledge, no work has tested this link using naturalistic daily measures of sleep reactivity, which may offer improved validity compared to retrospective assessments. To address this gap, we examined whether ACEs predicted higher sleep reactivity using daily data from a national sample of U.S. adults.

Methods: We analyzed data from the Midlife in the United States (MIDUS 3) study. We included participants who completed the National Study of Daily Experiences, an eight-day daily diary protocol assessing daily stressors and sleep (N=532). ACEs were assessed using the Childhood Trauma Questionnaire. Sleep reactivity was estimated from multilevel models where daily stress (occurrence and severity) predicted that night's sleep duration and quality. Random slopes were extracted from models to assess each participant's sleep reactivity to stress. Associations between ACEs and sleep reactivity were examined using linear regression, covarying for age and gender.

Results: Childhood trauma was not associated with sleep duration reactivity to stress occurrence ($\beta = 0.02$, 95% CI: -0.07-0.10, $p = .705$), sleep duration reactivity to stress severity ($\beta = 0.04$, 95% CI: -0.05-0.14, $p = .352$), or sleep quality reactivity to stress occurrence ($\beta = 0.01$, 95% CI: -0.07-0.10, $p = .757$). However, greater childhood trauma was associated with greater sleep quality reactivity to stress severity ($\beta = 0.13$, 95% CI: 0.04-0.22, $p = .007$).

Conclusion: Childhood trauma was associated with greater sleep reactivity. Early adversity may predispose individuals to more sleep disruption in the face of more intense daily stressors, highlighting a potential pathway through which ACEs influence adult sleep health.

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0151

INVESTIGATING CHILDHOOD ADVERSITY AS A MODERATOR BETWEEN SLEEP LOSS AND INTENTIONS TO EAT SWEETS/JUNK FOOD

Tyler Hilliard, Monica Skewes, Neha John-Henderson, Cara Palmer
Montana State University

Introduction: Prior work suggests poor sleep alters dopamine-reward systems (Wu et al., 2024), blunts positive emotions (Palmer et al., 2024), and increases cravings for sweet and fatty foods (Crispim et al., 2007; Kracht et al., 2019). Sleep loss also impacts negative emotional experiences, such as anxiety (Palmer et al., 2024). Additional studies have found that individuals vary in response to sleep loss, but moderators of these associations between sleep and daytime emotional experiences are not well-understood. Childhood adversity blunts responses to reward, heightens threat sensitivity, and may further exacerbate the effects of insufficient sleep.

Methods: Participants included 56 healthy adults, who reported on their childhood adversity, and were randomly assigned to one night of sleep restriction (4h TIB) or healthy sleep (8h TIB). The next morning, one hour after waking, participants completed measures of positive and negative affect, anxiety, and their cravings and intentions to consume sweets/junk food that day.

Results: Sleep restricted participants reported greater anxiety [$t(44.28) = 2.42$, $p = .02$]. Childhood adversity moderated the relationship between sleep restriction and both cravings ($p = .007$) and intentions ($p = .04$). Sleep restriction resulted in reduced cravings for sweets/junk food, but this was only significant for those reporting high levels of childhood adversity ($B = 2.10$, $SE = .62$, $p = .001$). Similarly, sleep restriction resulted in a reduction in intentions to consume sweets/junk food, but only at high levels of adversity ($B = 3.06$, $SE = .922$, $p = .002$). There were no differences in cravings or intentions for those with low adversity.

Conclusion: Prior research has found that sleep loss heightens anxiety and alters dopamine-reward systems in ways that heighten cravings. This study extends this prior work by examining how childhood adversity may alter these associations. Adversity was related to increased cravings and intentions after healthy sleep, but this was blunted after sleep loss. Sleep loss increased anxiety regardless of childhood adversity. These results reflect the complex mechanisms through which sleep and adversity interact to alter motivation and mesolimbic systems. Implications for future research will be discussed.

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0152

PERCEIVED STRESS MEDIATES THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES AND SLEEP QUALITY IN HEALTHY ADULTS

Julia Weinman¹, Matthew Reid¹, Darlynn Rojo-Wissar², Jeongwi An¹, Michelle Mei¹, Michael Smith¹

¹Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, ²Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University

Introduction: Adverse Childhood Experiences (ACEs) are associated with a wide range of negative health outcomes, including sleep disturbance. Prior literature has identified stress as a pathway linking early experiences of adversity and poor sleep in clinical and community samples, often with comorbid psychiatric or sleep complaints. However, additional empirical research in healthy adults, without medical or psychiatric comorbidities, remains necessary to improve our understanding of the impact of stress in nonclinical populations.

Methods: Participants included 55 healthy adults aged 18–47 years (59% female; 40% white, 25% Black, 17.31% Asian, 17.31% Other). At baseline, participants completed the revised ACE questionnaire assessing exposure to adversity during childhood. Subjective sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI), and perceived stress was assessed with the Perceived Stress Scale (PSS). A mediation model tested whether perceived stress mediated the association between ACEs and sleep quality.

Results: Descriptive analyses indicated low levels of childhood adversity and sleep disturbance, with moderate perceived stress. The mean ACE score was 2.33 ($SD = 2.06$), the mean PSQI global score was 2.93 ($SD = 1.99$), and the mean PSS score was 9.56 ($SD = 5.55$). Higher ACE scores were significantly associated with greater perceived stress ($b = 0.83$, $SE = 0.35$, $p = .023$). Perceived stress, in turn, predicted poorer sleep quality ($b = 0.18$, $SE = 0.05$, $p < .001$). The direct effect of ACEs on sleep quality was nonsignificant when controlling for stress ($b = -0.01$, $SE = 0.12$, $p = .95$). The indirect effect of ACEs on sleep quality through perceived stress was significant ($b = 0.15$, Bootstrapped $SE = 0.06$, 95% Bootstrapped CI [0.05, 0.31]), indicating full mediation.

Conclusion: Among healthy adults without clinical sleep problems, psychiatric or medical conditions, exposure to childhood adversity is indirectly linked to poorer sleep quality through higher perceived stress. These findings highlight perceived stress as an important psychological mechanism underlying the influence of ACEs on sleep. Future longitudinal studies should examine whether stress-related arousal processes contribute to the progression from early adversity to chronic sleep disturbance and related health outcomes.

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0153

EARLY ADVERSITY, PROTECTIVE EXPERIENCES, AND NOCTURNAL LONELINESS

Brandon Pattillo, Katie Cropper, Dustin Sherriff, Kara M. Duraccio, Daniel Kay
Brigham Young University

Introduction: Nocturnal Loneliness (NoLo), feeling alone at night or with one's sleep difficulties, is a novel construct that may have important implications for sleep and mental wellbeing. Adverse childhood experiences (ACEs) are robustly associated with general loneliness across the lifespan, and loneliness serves as a key mechanism of disturbed sleep. This study aimed to understand the relationship between ACEs and NoLo, and whether protective and compensatory childhood experiences (PACEs) have a mitigating role in this association.

Methods: A sample of 442 participants completed questionnaires via Qualtrics accessing NoLo, ACEs, PACEs, and other relevant demographic variables. A three-class Bayesian mixture regression model was used to test whether associations between adversity, protective factors, and nocturnal loneliness indicators differed across latent subgroups.

Results: We found support for 3 latent classes in the association between ACEs, PACEs, and NoLo when including demographic variables. Higher ACEs was associated with associated with greater NoLo across all three latent classes, whereas PACEs were inversely associated, reflecting consistent protective effects. Groups with higher proportions of females tended to show stronger associations between ACEs and nocturnal loneliness while older age was modestly associated with lower NoLo.

Conclusion: Our results support and extend prior findings by showing that ACEs are linked not only to general loneliness but also extend into the night, predicting NoLo. The stronger associations between ACEs and NoLo observed in females suggest that NoLo may be an important factor in understanding the heightened sensitivity women show to early adversity in relation to sleep disturbance. Interventions targeting sleep disturbances may benefit from addressing nighttime loneliness, especially for individuals who have been screened for ACE exposure. Additionally, the potential protective role of PACEs may be a target to promote resilience against nocturnal loneliness.

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0154

EXPLORING INCOME AS A POTENTIAL RISK FACTOR FOR INSOMNIA IN THE ACUTE AFTERMATH OF TRAUMA

Cameron McCray¹, Anthony Reffi², Lily Jankowiak¹, Elle Wernette², David Moore², Christopher Drake²

¹Henry Ford Sleep Research Center, ²Henry Ford Health System

Introduction: Insomnia is a common effect of acute trauma exposure. Insomnia is associated with various social determinants of health (SDoH), such as income level and urbanicity. One unexplored question is which SDoH are linked with insomnia within the acute aftermath of trauma. We examined the relationship between income, urbanicity and post-trauma insomnia severity among patients hospitalized in Detroit, MI following traumatic injury.

Methods: Patients (N = 88, Mage = 39.53 ± SD 14.31, 67% male, 67% Black or African American, 48% reported income ≤ \$20,000, 76% Wayne county residents) hospitalized after experiencing

traumatic injury were surveyed within five days of trauma (T1) to assess pre-trauma insomnia symptom severity (ISI) and depression symptom severity (PHQ-9), and again approximately one month later (T2) to evaluate post-trauma ISI. Annual household income and zip code were collected during hospitalization and coded as above or below \$20,000 and residing within or outside of Wayne County, MI.

Results: Patients reporting an annual household income of ≤ \$20,000 had significantly higher T2 ISI scores (N = 42, M = 15.68, SD = 7.07) than those in the higher income group (N = 46, M = 11.50, SD = 6.69; $t(58.97) = 2.37$, $p = .021$, 95% C.I. = 0.65, 7.70, $g = 0.60$). Annual income of ≤ \$20,000 remained significantly associated with more severe ISI at T2 after controlling for depression at T1 ($\beta = -6.20$, $p = .019$). However, the relationship between income and T2 insomnia was no longer significant after accounting for T1 ISI ($r = -0.18$, $p = .158$). Zip code was not correlated with T2 insomnia ($p = .09$).

Conclusion: An annual household income of \$20,000 or less was prospectively associated with more severe insomnia after trauma, above and beyond pre-trauma depression symptoms. However, this correlation was not significant after accounting for pre-trauma insomnia. Future research should evaluate SDoH on a more granular level (census tract or neighborhood) to increase specificity and identify which SDoH affect post-trauma insomnia beyond the contribution of baseline sleep to inform future treatment for at-risk populations.

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0155

THE ASSOCIATION BETWEEN PERCEPTIONS OF SOCIAL ROLES AND INSOMNIA SYMPTOMS AMONG RACIAL/ETHNIC DIVERSE WOMEN IN MID-LIFE

Luciana Giorgio Cosenzo, Rosaura Hernandez

University of Alabama School of Social Work

Introduction: Optimal sleep quality is essential for overall health. Alarming, women are more likely than men to experience insomnia, with gender differences widening during mid-life. Although biological factors partially explain these differences, gendered psychosocial stressors may exacerbate these differences. Specifically, women are more likely than men to have multiple social roles, such as working and caregiving, which may increase women's stress burden leading to increased insomnia symptoms. Most sleep studies have measured social roles objectively, ignoring how perceptions of these roles impact women's sleep. This study examines the independent and synergistic effects perceiving social roles as rewarding and stressful on insomnia among mid-life women.

Methods: Using survey data from mid-life women participating in the Study of Women Across the Nation Wave 1 (n=2,325), we conducted standardized linear regressions to test the effects of rewarding and/or stressful social roles on insomnia symptoms. Scores for rewarding and stressful social roles were summed

across social role categories (i.e., employment, family caregiving, being a spouse/partner, and childrearing). Insomnia symptoms were measured using the Women's Health Initiative Insomnia Scale (WHIIRS). Because social roles can be simultaneously rewarding and stressful, we created a 4-level variable with combinations of high/low reward and stress—rewarding, ambivalent, stressful, and indifferent—to test synergistic effects. Models were adjusted for sociodemographic characteristics, health conditions, and number of social roles.

Results: Participants had $\text{Mage}=46.83(\text{SD}=2.68)$ and most identified as non-Latina White (50.06%), spoke English (87.53%) and were perimenopausal (70.67%). On average, participants reported WHIIRS of $4.96(\text{SD}=3.82)$. A one unit increase in perceiving social roles as rewarding was associated with a 0.07 unit decrease in WHIIRS ($\text{SE}=0.01, p=0.003$). A one unit increase in perceiving social roles as stressful was associated with a 0.13 increase in WHIIRS ($\text{SE}=0.01, p<0.001$). In synergistic effects models, ambivalent, stressful, and indifferent social roles were statistically significantly associated with greater WHIIRS than rewarding social roles.

Conclusion: Our findings suggest that reducing stress from social roles may improve insomnia symptoms among mid-life women. Tailoring evidence-based interventions, such as CBT-I, for mid-life women to address these stressors may be warranted. Future studies should leverage longitudinal designs to test the directionality of these associations.

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0156

THE ASSOCIATION OF LIVING ALONE WITH DEPRESSION AND INSOMNIA AMONG RURAL ADULTS: A SOCIAL SUPPORT PERSPECTIVE

Joon Chung¹, Emily Slade², Daniela Moga², Maliha Mehnaz Mitu², Mairead Moloney¹, Michael Grandner³

¹University of Miami Miller School of Medicine, ²University of Kentucky, ³University of Arizona

Introduction: More than a quarter of Americans now live alone, a strong risk factor for depression and insomnia. Social support—encompassing emotional, instrumental, and informational assistance—represents a mechanistic pathway through which living arrangements may influence sleep and mental health. Does social support mediate the relationship between living alone and the comorbidity of depression and insomnia among adults in rural Appalachia? Our primary model examined the association between living alone and a composite depression-insomnia outcome, with social support as a mediator. Supporting models evaluated the associations between living alone and insomnia with serial mediation through social support and depression, and between living alone and depression with serial mediation through social support and insomnia.

Methods: Participants in the REST-KY study were recruited from 12 counties in Eastern Kentucky in the Central Appalachian region of the United States. All counties are sparsely resourced, rural, and economically distressed. The final analytic sample comprised 252 participants. Eligible participants completed well-validated scales

measuring sleep, mental health, and social support. An insomnia-depression comorbidity index was constructed by Principal Component Analysis. The primary analysis utilized a causal mediation approach (5,000 simulations) using the mediation package. Supporting analyses utilized a serial mediation approach using the lavaan package. Analyses were conducted in R.

Results: Among these participants, 52 (20.6%) reported living alone. Individuals living alone were more likely to be unmarried and had significantly lower household incomes. Participants living alone had significantly lower social support scores compared to those not living alone ($p<0.001$) and were significantly more likely to experience mild to severe depressive symptoms ($p=0.008$). In causal mediation models, social support accounted for 47.9% of the total effect between living alone and depression/insomnia comorbidity (Average Causal Mediated Effect [95% Confidence Interval]: 0.21 [0.08, 0.37]). While the total effect was significant ($p=0.028$), the direct effect was not ($p=0.24$).

Conclusion: Living status is associated with lesser social support, greater depressive symptoms, and greater insomnia severity. These results suggest that the relationship between living alone and insomnia severity operates substantially through the pathway of reduced social support. Interventions focused on living arrangements or social relationships may improve depressive symptoms or insomnia severity.

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0157

FROM ADVERSE CHILDHOOD EXPERIENCES TO INSOMNIA SEVERITY AND TREATMENT PREFERENCE: MALADAPTIVE SLEEP BELIEFS AS A KEY MECHANISM

Chung-Yuan Wu¹, Evan Wight¹, Afton Craig¹, Dustin Sherriff-Clayton¹, Chongming Yang¹, Spencer Nielson², Kara M. Duraccio¹, Daniel Kay¹

¹Brigham Young University, ²Virginia Commonwealth University

Introduction: Adverse childhood experiences (ACEs) are major predisposing factors for insomnia in adulthood and have been linked to a greater preference toward medication for insomnia over behavioral interventions. ACEs may also shape beliefs about sleep that are known to influence insomnia treatment preference. Whether ACEs affect insomnia and its treatment acceptability via maladaptive beliefs is unknown. We hypothesized that having more ACEs would be associated with more dysfunctional beliefs about sleep, thereby conferring risk for insomnia severity and preference for medication over behavioral interventions.

Methods: In this secondary analysis of the NOLO online survey study ($N=442$), we analyzed measures of the demographics survey, ACEs Questionnaire, Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16) scale, Insomnia Severity Index, Insomnia Treatment Acceptability Subscales for behavioral (ITAS-B) and medication (ITAS-M), and Patient-Reported Outcomes Measurement Information System–Depression Scale. We conducted structural equation modeling (SEM) to examine the indirect paths of ACEs to insomnia, mediated by DBAS and depression. We also examined

the direct and indirect effects of ACEs on treatment acceptability for medications and behavioral interventions, accounting for DBAS and depression.

Results: The SEM showed adequate global fit, $\chi^2(24)=72.997$, RMSEA=.068, CFI=.975. ACEs had a moderate total effect on insomnia severity ($\beta=.51^{**}$), with mostly indirect effects ($\beta=.36^{**}$), including ACEs to DBAS to insomnia ($\beta=.23^{**}$) and ACEs to depression to insomnia ($\beta=.12^{**}$). ACEs had a small total negative effect on ITAS-B ($\beta=-.24^{**}$) that was almost entirely mediated by indirect effects ($\beta=-.21^{**}$), including ACEs to depression to ITAS-B ($\beta=-.08^{*}$) and ACEs to DBAS to insomnia to ITAS-B, adjusting for depression ($\beta=-.13^{**}$). For ITAS-M, ACEs showed an indirect pathway that included ACEs to DBAS to ITAS-M ($\beta=.19^{**}$).

Conclusion: Results support our hypothesis that dysfunctional beliefs about sleep confer risks for insomnia severity and impact treatment acceptability in the context of ACEs. While ACEs make treatment for insomnia generally less acceptable, through dysfunctional beliefs and depression, there is a relative preference for medication over behavioral intervention for insomnia. These findings highlight the importance of preventing ACEs and using targeted interventions that address dysfunctional beliefs, along with screening for clients' history of ACEs and maladaptive schemas during treatment planning.

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0158

POSTPARTUM INFLAMMATION AND SLEEP PROBLEMS: THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES

Elizabeth Hinckley¹, Kent Teague², Immanuela-Nicole Enwesi¹, Lucia Ciciolla¹

¹Oklahoma State University, ²University of Oklahoma-Tulsa

Introduction: Sleep problems are highly prevalent in the early postpartum period and often reflect the dynamic interplay of biopsychosocial influences. Inflammation, particularly the cytokine TNF- α , plays a regulatory role in sleep, with human

studies linking higher TNF- α to alterations in sleep quality and rodent models demonstrating its somnogenic effects on NREM sleep. However, inflammatory pathways may also be shaped by developmental context, like early adversity. Although associations between threat-related early adversity and alterations in stress- and immune-system functioning have been identified, no research has examined whether such adversity moderates associations between inflammation and postpartum sleep. The current study examined whether threat-related adversity moderated the association between TNF- α and sleep problems at 6 weeks postpartum.

Methods: Participants included 151 pregnant women (49.7% white) who completed questionnaires on demographics and childhood adversity (MACE5) at 35 weeks gestation. Following prior work⁶, severity scores from seven subscales were summed to create a threat composite. At 6-weeks postpartum, mothers reported on their sleep (WHIIRS7) and provided serum samples assayed for TNF- α .

Results: Linear regression analysis showed threat-related adversity moderated the association between maternal inflammation and sleep problems ($b = -0.074$, $SE = 0.038$, $p = .050$). Follow-up simple slope analyses probed the association between TNF- α and sleep problems at low (-1 SD), mean-centered, and high ($+1$ SD) levels of threat. The association between TNF- α and postpartum sleep problems was significant at mean ($b = -1.27$, $SE = 0.49$, $p = .010$) and high ($b = -2.36$, $SE = 0.74$, $p = .001$) levels of threat, but not at low levels. Among mothers with higher threat-related adversity, elevated TNF- α was associated with fewer postpartum sleep problems.

Conclusion: Elevated TNF- α was associated with fewer sleep problems, consistent with evidence that TNF- α promotes NREM sleep, although only among women with moderate-to-high adversity. TNF- α 's sleep-promoting effects may be most evident under physiological strain, including postpartum recovery, and early threat may similarly heighten sensitivity to cytokine variation, calibrating immune responsivity in ways that make inflammatory signals more consequential for sleep. These patterns highlight the value of considering adversity when modeling perinatal biological risk and identifying mothers at elevated sleep-related risk.

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0159

SLEEP RESILIENCE IN DIVISION I FOOTBALL PLAYERS: VALIDATION OF THE SRQSA

Dustin Sherriff, Meredith Woolley, Marley Elsasser, Kara M. Duraccio, Daniel Kay

Brigham Young University

Introduction: Sleep resilience refers to the capacity to maintain effective functioning despite sleep adversity, including disruptions to sleep quantity, quality, or timing. Although higher sleep resilience has been associated with lower sleep-related impairment, little is known about sleep resilience in collegiate athletes, who frequently experience sleep disturbances due to training, travel, academics, and stress. Existing measures demonstrate strong reliability and a unitary structure in general populations, but have not been validated in athletes. This study evaluated the reliability, validity, and dimensionality of the novel Sleep Resilience Questionnaire for Student Athletes (SRQSA) and tested its convergent and divergent validity through associations with other sleep variables.

Methods: We performed secondary data analysis on a parent intervention study that included 114 male college football athletes (ages 18-26). Participants completed the SRQSA and additional measures assessing sleep health, disturbance, impairment, and chronotype. Analyses included item-total correlations, internal consistency, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), test-retest reliability, linear regressions, and independent-samples t-test.

Results: The SRQSA demonstrated excellent internal consistency ($\alpha=.95$) and unidimensional structure supported by EFA and CFA $\chi^2(41)=81.57, p<.001$; RMSEA=.07; 90%CI[.05,.09], CFI=.996; TLI=.994($\Omega=.96$). Test-retest reliability was moderate (ICC=.51-.68). Validity analyses showed that lower sleep resilience was associated with higher sleep disturbance ($\beta=-.23, p=.001$), greater sleep-related impairment ($M=35.79$ vs. $43.12, t(213)=-4.33, p<.001, d=-0.76$), and an evening chronotype ($\beta=-.17, p=.012$). Higher sleep resilience was associated with better sleep health ($\beta=.18, p=.007$). All associations were statistically significant with small to moderate effect sizes.

Conclusion: The SRQSA is a reliable and valid measure of sleep resilience in collegiate athletes. Findings support sleep resilience as a distinct construct within the sleep domain, offering opportunity for future research on its role in recovery and performance. This measure provides the initial foundation for developing resilience-based interventions to help athletes maintain function amidst unavoidable sleep disturbances.

Support (if any):

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0160

TRANSCRANIAL DIRECT CURRENT BRAIN STIMULATION DURING SLEEP DEPRIVATION REDUCES PERFORMANCE AND RECOVERYTracy Jill Doty¹, Tiffanie Butler¹, Sidney Allotey-Addo¹, Emily Stekl¹, Chloe Fong¹, Isabelle Kennealy¹, Michael Fajuyigbe¹, Beza Negash¹, Kajsa Carlsson¹, Lonique Moore¹, Samantha Riedy¹, Thomas Balkin¹, Tad Brunye², John Hughes¹¹Sleep Research Center, Center for Military Psychiatry and Neuroscience, Walter Reed Army Institute of Research, ²U.S. Army DEVCOM Soldier Center

Introduction: Previous research suggests that transcranial direct current stimulation (tDCS) applied to the prefrontal cortex (PFC) during sleep deprivation (SD) slows the rate of sleep loss-induced performance degradation. However, the effect of tDCS on recovery sleep and subsequent performance has not yet been assessed. The current study was conducted to determine whether, and the extent to which, PFC tDCS enhances performance during sleep loss and recovery.

Methods: Seventeen healthy adults completed a four-night study with a 2h sleep opportunity at 2300 followed by 46h SD and two 8h recovery sleep opportunities. Four 2mA stimulations were given for 10 min during the SD period (1.5, 2.75, 25.25, and 26.5 hr into SD) for the stim group (N=9). Participants receiving sham stimulation (N=8) experienced a ramp up and down at the beginning and end of the stimulation period. A 10-min PVT was administered every ~75 min, and all sleep periods were investigated using a 13-lead PSG. PVT minor lapses (> 500 ms) and speed change from baseline were analyzed using a 4 (Experimental Day) x 2 (Group) Generalized Linear Model. N3 sleep duration was analyzed for the two recovery nights in a 2 x 2 model.

Results: Participants in the stimulation group experienced more minor lapses [main effect of Group, $W(1) = 21.56, p < 0.001$] and slower speeds [main effect of Group, $W(1) = 12.65, p < 0.001$] than the sham group across all experimental days (SD and recovery). Additionally, participants in the stimulation group had more N3 sleep during recovery compared to sham [main effect of Group, $W(1) = 11.89, p < 0.001$].

Conclusion: Contrary to previous findings, PFC tDCS applied during sleep loss did not result in a reduced rate of performance degradation. In fact, it resulted in worse performance throughout both the sleep loss and recovery periods and increased N3 duration during recovery sleep compared to the sham group. These findings may be attributed to the induction of a further increase in the cortical excitatory/inhibitory ratio, already elevated in SD, leading to greater impairment in information processing and accelerating the accrual of homeostatic sleep drive.

Support (if any): Military Operational Medicine Research Program/Defense Health Agency

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0161

THE NAP TRAP: HOW SLEEP REACTIVITY INFLUENCES POST-NAP SLEEPINESSEthan Green, Izza Peeran, Elle Wernette, Philip Cheng
Henry Ford Health System

Introduction: Sleep reactivity describes how vulnerable an individual's sleep is to disturbances such as stress and other stimuli. Those with high sleep reactivity are more likely to have poorer sleep quality, especially in night shift workers who frequently experience environmental disruptions when sleeping during the day. However, the effect of sleep reactivity on sleep without the presence of environmental disruption has not been well established. Here, we assessed the extent to which sleep reactivity predicted how restorative a nap was. We predicted individuals with higher sleep reactivity would experience less restorative sleep as index by higher subjective sleepiness.

Methods: We collected data from night shift workers (N = 129) who had been in the lab for at least one period of 24 hours of saliva collection to participate in other studies. During their time in the lab participants sat in a dimly lit room with minimal outside noise.

Sleep reactivity was evaluated using the Ford Insomnia Stress Test (FIRST) questionnaire, and sleepiness pre- vs post-nap was evaluated using Karolinska Sleepiness Scale (KSS). Participants' first naps in the lab were used to collect data, to control the effects of sleep inertia.

Results: We found that higher sleep reactivity was associated with a smaller decrease in pre- vs post- KSS scores ($p = 0.017$, $\beta = 0.21$, $R^2 = 0.046$).

Conclusion: Based on the results collected, there was significant evidence to support the original hypothesis. Sleep reactivity was positively associated with KSS score differences. Additionally, this data is the first to show that sleep reactivity limits how restorative sleep may be. This is likely because sleep reactivity makes individuals more easily aroused, thus reducing how restorative sleep is. However, based on the standardized coefficient and multiple r-squared, this is a small effect. Although sleep reactivity may not account for much sleepiness after sleep, these data suggest that even for night shift workers who get an equal amount of sleep, sleep reactivity may predict whose sleep is more restorative.

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0162

SLEEP MODERATED INTERVENTION EFFICACY IN TWO RANDOMIZED CONTROLLED TRIALS AIMED AT INCREASING PHYSICAL ACTIVITY AMONG INACTIVE LATINAS

Tayla von Ash¹, Shira Dunsiger¹, Belinda O'hagan², Michael Onu², Sugandha Gupta-Louis², Lauren Connell Bohlen², Tanya Benitez², Bess Marcus²

¹Brown University School of Public Health, ²Brown University

Introduction: Sleep and physical activity (PA) have a bidirectional relationship, with regular PA improving sleep quality and adequate sleep enhancing energy, motivation, and performance for PA. Sufficient sleep and PA improve health across various domains but many women, especially Latinas, do not meet sleep and/or PA guidelines. While targeted interventions have been designed and tested, research is needed to elucidate determinants of intervention success. This study examined sleep as a possible moderator of the intervention effect on PA outcomes in two randomized controlled trials (RCTs) designed to increase moderate-to-vigorous PA (MVPA) among inactive Latinas.

Methods: We conducted a secondary analysis of data from two RCTs ($n=205$ and $n=195$). Using a series of generalized mixed effects models with subject-specific intercepts, we tested the hypothesis that sleep moderated the intervention effect on PA outcomes. Models simultaneously regressed minutes/week of MVPA at each follow-up on time, group, time*group, sleep, time*sleep, group*sleep, and time*group*sleep. Interest was in understanding if effects of the intervention differed by sleep and if differential effects based on sleep also differed over time. Sleep was quantified both continuously and dichotomously (whether or not participants slept at least 7 hours). Analyses were run separately for each RCT to help establish consistency of findings.

Results: Sleep (whether operationalized as continuous or dichotomous) was a significant moderator of intervention effect on PA outcomes over time in both RCTs, $p's < .05$. The intervention effect was stronger for participants who slept at least 7 hours per day;

longer sleep led to increased experienced benefits from the intervention whereas participants with insufficient sleep performed similarly across time regardless of group assignment.

Conclusion: To our knowledge, this is the first study to examine sleep as an effect modifier of PA intervention success. Given our findings, that sleep indeed moderated the intervention effect in two different RCTs with different samples, future PA interventions should consider tailoring intervention content or materials based on characteristics of participant sleep. The implications of our findings are particularly relevant for PA interventions targeting Latinas since they are at high risk for both insufficient sleep and PA.

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0163

THE BEHAVIORAL ECONOMICS OF WAGE-DRIVEN SLEEP LOSS IN SAFETY-CRITICAL AND SAFETY-NEUTRAL OCCUPATIONS

Derek Reed, Steven Hursh

Institutes for Behavior Resources, Inc.

Introduction: Insufficient sleep is a pervasive public health concern with well-documented consequences for cognitive performance, safety, and productivity. Although time is arguably the most fundamental human resource, behavioral economic approaches rarely treat sleep as a commodity that individuals "spend" in competition with other reinforcers, such as paid work.

Methods: This study applied a behavioral economic framework to quantify how adults trade off sleep time for overtime pay when both behaviors draw from a fixed daily time budget. A total of 164 adults were recruited from the crowdsourcing platform Prolific into a 2x2 between-subjects design crossing subjective socioeconomic status (high vs. low SES) with occupations varying in workplace safety demands (safety-critical vs. safety-neutral). This allowed us to assess whether socioeconomic context and job requirements influence the "price" at which individuals forgo sleep. Participants completed a novel task in which they imagined working a 10-hour shift and were offered varying overtime pay rates for additional consecutive work hours. Each day also included 10 discretionary hours to be allocated between extra work and sleep, making sleep loss the cost of increased labor. For each wage value, participants indicated the number of hours they would devote to work and sleep, enabling estimation of sleep demand.

Results: Results showed orderly demand curves across all groups: higher overtime pay reliably shifted allocations toward more work and less sleep. However, the effective wage at which individuals were willing to reduce sleep to ≤ 4 hours differed systematically. Participants with higher SES required substantially higher overtime pay to accept severe sleep loss, whereas those with lower SES accepted major sleep reductions at much lower wage levels. Individuals assigned to safety-critical occupations were also more conservative in trading off sleep, requiring higher pay before reducing sleep, though SES and safety risk did not interact, indicating independent effects of socioeconomic context and occupational framing on sleep elasticity.

Conclusion: These findings demonstrate that sleep can be conceptualized and quantitatively modeled as a valued, constrained commodity subject to price-controlled tradeoffs. Integrating

behavioral economics with fatigue science offers a promising approach for predicting risk, informing scheduling policy, and designing interventions that protect worker health and safety.

Support (if any):

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0164

SLEEP, CIRCADIAN, AND HOMEOSTATIC INFLUENCES ON VISUAL ATTENTION PERFORMANCE DURING TEAM-BASED SIMULATED GROUND VEHICLE MISSIONS

Amanda Hudson¹, Benjamin McManus¹, Piyush Pawar¹, Josh White¹, Thomas Anthony², Victor Paul³, Terrance Tierney³, Andrea Underhill¹, Despina Stavrinos¹

¹Institute for Social Science Research, ²Analytical AI, ³U.S. Army DEVCOM Ground Vehicle Systems Center

Introduction: Sleep insufficiencies and fatigue can impair cognitive performance and operational effectiveness, compromising warfighter readiness and mission success. Visual attention in particular is sensitive to sleep loss—especially with increasing time-on-task—an issue for long-term missions. However, it remains unclear which subjective or objective sleep-related indicators best predict visual attention in dynamic, visually demanding operations. This study investigated the extent to which various sleep factors predicted visual attention during a collaborative, team-based simulated ground vehicle mission.

Methods: N=240 participants (40 teams of n=6) completed four simulated drives within a shared environment under different, randomly ordered assistance conditions: No Assistance (manual operation of vehicles), Object Detection System (ODS; targets identified with video/audio), Vehicle Automation (self-driving vehicle), and Vehicle Automation + ODS (i.e., Combined). During each drive, their primary mission was to search for and locate target objects of interest as a team. Sleep outcomes were assessed at baseline (appointment time, sleep quantity, sleep quality, KSS, time awake, nap, caffeine consumption) and in-task (PERCLOS >=30%, KSS). Roadway Environment Attention was calculated as the percentage of time eye-gaze intersected the simulated roadway environment during each drive, while Mean Look Reaction Time (RT) was the average time for eye-gaze to intersect with target objects once in view. A series of mixed linear growth models were run for each attention outcome using the above predictors.

Results: Roadway Environment Attention during the Combined Assistance condition was significantly lower than during the No Assistance (Tukey-adjusted $p < .001$), Vehicle Automation (Tukey-adjusted $p < .001$), and ODS conditions (Tukey-adjusted $p = .016$); no other predictors were significant (all $ps \geq .163$). There were no significant predictors of Mean Look RT (all $ps \geq .240$), though higher KSS showed a marginal trend toward slower RTs ($p = .067$).

Conclusion: Contrary to our expectation, few sleep-related factors predicted visual attention during this short-duration, team-based simulated mission. Assistance systems had a stronger influence on gaze behavior than sleepiness, suggesting workload offloading drove attention reductions. Longer or more fatigue-inducing paradigms may be needed to capture sleep-related declines in visual attention.

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0165

FROM INSOMNIA TO BURNOUT: THE ROLE OF PSYCHOLOGICAL NEED THWARTING IN COLLEGIATE ESPORTS

Arash Assar¹, Ana Julia Mourao², Anjolie Diaz², Niloufar Lueke³, Ivan Vargas¹

¹University of Notre Dame, ²Ball State University, ³Austin Peay State University

Introduction: Esports, or electronic sports, is a rapidly expanding competitive domain involving individual- or team-based video gaming organized around structured tournaments and ranking systems. The intensive training demands, heavy screen exposure, and irregular routines of collegiate Esports may contribute to elevated sleep disturbance and burnout, yet the mechanisms linking insomnia to burnout remain unclear. Self-Determination Theory (SDT) posits that well-being depends on satisfying autonomy, competence, and relatedness needs, and that the frustration (thwarting) of these needs contributes to stress and exhaustion, making it important to test both need satisfaction and thwarting as explanatory pathways. From this perspective, insomnia may function as an upstream stressor that undermines athletes' sense of control, efficacy, and social connection. Guided by SDT, we examined whether insomnia severity was associated with burnout through basic psychological need processes.

Methods: Collegiate Esports athletes (N = 112; M = 20.38, SD = 1.73) from universities across all major U.S. regions completed validated measures of insomnia, need satisfaction and thwarting, and burnout. Parallel mediation models tested satisfaction- and thwarting-based pathways linking insomnia to burnout (controlling for training hours). An exploratory reverse model (Burnout → Need Processes → Insomnia) probed potential bidirectionality.

Results: In the need-thwarting model, insomnia was associated with burnout through competence thwarting ($\beta = .11$, SE = .05, 95% CI [.01, .23]), representing a moderate indirect effect, with the direct effect nonsignificant—consistent with full mediation. No significant indirect effects emerged in the need-satisfaction model. In the exploratory reverse model, burnout was associated with insomnia through relatedness thwarting ($\beta = .14$, SE = .06, 95% CI [.04, .28]), also a moderate effect, again with a nonsignificant direct effect. Together, these findings support bidirectional need-based mechanisms linking insomnia and burnout.

Conclusion: This study provides the first mechanistic evidence linking insomnia and burnout in Esports athletes. Competence thwarting (but not need satisfaction) explained the insomnia → burnout pathway, whereas relatedness thwarting explained the burnout → insomnia pathway. Together, these findings reinforce SDT's position that psychological need thwarting, rather than low satisfaction, is the more proximal driver of burnout and other maladaptive outcomes. Targeting both sleep and factors that thwart psychological needs may help reduce burnout risk in this population.

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0166

EXPOSURE TO BLUE-ENRICHED LIGHT FOLLOWING A 1-HOUR NAP EXTENDS DURATION OF BENEFITS TO SLEEPINESS AND PERFORMANCE

Rachel Jansen¹, Cassie Hilditch², Erin Flynn-Evans¹¹NASA Ames Research Center, ²Central Queensland University

Introduction: When an unavoidable work task occurs during the night, workers must be sufficiently alert to perform safely. Both blue-enriched lighting and napping improve alertness and performance at night, but it is unclear how much or how long each intervention contributes to such improvements. We conducted a study to evaluate these interventions separately and together.

Methods: Participants completed two 26-hour laboratory visits, each following a week of 8.5 h time-in-bed (verified by actigraphy), where they completed an hourly 5-minute psychomotor vigilance task (PVT) and sleepiness visual analog scale. Participants were randomized by visit to undergo a control condition involving a 1-hour awake rest period under 150 lux lighting (rest+150) and one of three experimental conditions involving either 1) a 1-hour nap opportunity followed by 150 lux (nap+150), 2) a 1-hour nap opportunity followed by 250 melanopic EDI (mEDI; nap+250), or 3) a 1-hour rest period followed by 250 mEDI (rest+250). Each intervention began 20 hours after habitual waketime and the lights remained on post-nap/rest until discharge 7 hours later. We compared outcomes on the seven tests following the nap/rest between conditions using linear mixed-effects models with participant as a random effect, and age and sex as covariates, and performed post-hoc comparisons of each post-nap/rest test bout relative to the test immediately before the nap/rest.

Results: Thirty-two participants completed the study (16 female; MAge $\pm$ SD = 24 $\pm$ 5 years). Compared to control, participants rated their sleepiness as lower following a nap (nap+250 β = -14.3, p < 0.001; nap+150 β = -15.4, p < 0.001) and had faster PVT speeds (nap+250 β = 0.21, p < 0.001; nap+150 β = 0.23, p < 0.001), but there was no improvement in the rest+250 condition. Post-hoc analyses comparing each post-nap/rest test to the pre-intervention test revealed significantly lower sleepiness ratings 2-5 hours after a nap+250 (compared to control) and faster PVT speed at each hour (1-7) after nap/rest end. PVT speed was also better than control 1-4 hours after wake in the nap+150 condition. The rest+250 condition was not different.

Conclusion: Our preliminary results suggest that a short nap at night improves subsequent reaction time, while blue-enriched light sustains these effects.

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0167

EXAMINING WHETHER INCREASED PRACTICE MODERATES TOTAL SLEEP DEPRIVATION IMPAIRMENTS IN DYNAMIC DECISION-MAKING

Sofia Fluke, Hannah Kircher, Ashlynn Foust, Briann Satterfield, Courtney Kurinec

Washington State University

Introduction: Research has shown that total sleep deprivation (TSD) disrupts performance on fast-paced, dynamic decision-making tasks where the correct response is learned from trial-and-error and where conditions can change without warning. These impairments are believed to be driven by underlying problems with learning and updating the correct responses from feedback. However, previous studies have only investigated the effect of TSD on dynamic decision-making before and after a night of wake. It is unclear whether increased practice would moderate TSD-driven decrements. To elucidate this, we increased the number of task administrations throughout TSD.

Methods: N=13 healthy, normal sleepers (ages 26.7 $\pm$ 7.3, 9 females) participated in a 4-day, 3-night in-laboratory study. Following 9h baseline sleep (22:30–07:30), participants underwent 39h TSD, with subsequent 9h recovery sleep (22:30–07:30). Every 12 hours, participants completed 1 of 4 versions of a dynamic decision-making task, the Go/No-Go with reversal (GNGr). The GNGr was administered at 2, 14, 26, and 38-hours of wakefulness. Participants had to learn from feedback which two-digit stimuli required a keypress (go) or no response (no-go) and when to update their responses as the contingencies unexpectedly reversed. A signal detection framework was used to calculate discriminability, or the ability to differentiate between go and no-go stimuli. Performance was split into pre- and post-reversal phases, and each phase was divided into 3 equal blocks. We analyzed discriminability using mixed-effects ANOVA, with fixed-effects of session (1-4), phase (pre/post-reversal), block (1-3), and their interactions, with a random intercept over participants.

Results: Performance during the TSD sessions (3 and 4) was significantly worse compared to the rested sessions (1 and 2; p s $\leq$ 0.026). Contrary to expectations, performance did not significantly improve from session 1 to 2 (p = 0.246).

Conclusion: Increasing administrations did not abolish TSD-related decrements. Unlike previous studies, participants did not improve across rested sessions. The interval between rested sessions in our study did not include a period of sleep, possibly indicating that sleep is needed to meaningfully improve performance across earlier sessions. Future studies should investigate whether TSD impairments in dynamic decision-making are dose-dependent and at what specific dose significantly impairs decision-making.

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0168

CONSISTENCY OF SLEEP REGULARITY MEASUREMENT FROM SUBJECTIVE RECALL VS OBJECTIVE MEASUREMENT

Yasmine Robles, Andrew McHill, Brooke Shafer
Oregon Health & Science University

Introduction: Irregular day-to-day sleep timing is associated with increased cardiometabolic risk, including hypertension, obesity, and diabetes, all of which are strong predictors of mortality. Because different measurement approaches (i.e., recall vs. objective measures) with potential varying observation lengths (i.e., 1-week vs 2-weeks) could yield differing timing estimates, understanding the level of agreement between approaches is crucial for both research and clinical applications. Thus, we assessed the similarity between sleep timing regularity derived from recall

and objective daily sleep diaries across 7- and 14-day tracking intervals.

Methods: Twenty-five participants (18 F) reported previous 7-day recall of sleep onset and offset times via an online survey, then completed daily sleep-wake diaries for up to 14 days. We calculated the Sleep Regularity Index (SRI), reflecting day-to-day timing consistency, and the standard deviation (SD) of sleep onset from recall, the first 7-days of tracking, and the full 14-days of tracking. Associations between recall and objective measures for SRI and SD were tested using Pearson correlations. Intraclass correlation coefficients (ICC) from a two-way mixed-effects model assessed individual consistency with strengths classified as slight (0.00-0.20), fair (0.21-0.40), moderate (0.41-0.60), substantial (0.61-0.80), and almost perfect (0.81-1.00).

Results: There was a positive association between recall and 7-day objective tracking for SRI ($r=0.58$; $p < 0.01$) and a non-significant trend for an association between recall and SD of sleep onset ($r=0.36$; $p=0.07$). The consistency between recall and 7-day objective tracking was “moderate” for SRI (ICC = 0.53) and “fair” for SD of sleep onset (ICC=0.36). When comparing recall with 14 days of tracking, associations were significant for both SRI ($r=0.62$; $p < 0.01$) and SD of sleep onset ($r=0.65$; $p < 0.01$), with ICC values of “moderate” consistency for SRI (ICC=0.54) and “substantial” consistency for SD sleep onset (ICC=0.62).

Conclusion: Understanding how sleep regularity is measured may be essential for accurately interpreting its associations with health. Regularity from subjective recall was moderately consistent with objectively measured timing at 7-days of tracking, with stronger agreement over 14 days of tracking. These findings may underscore methodological considerations for researchers and clinicians when objective measures are impractical and suggest recall-based estimates may better capture long-term patterns than short-term regularity.

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0169

CIRCADIAN DISRUPTED FLIGHT OPERATIONS REDUCE AIRLINE PILOT SLEEP, ALERTNESS, AND COGNITIVE PERFORMANCE

Erin Flynn-Evans¹, Nicholas Bathurst¹, Lucia Arsintescu², Kevin Gregory³, Sean Pradhan⁴, Rachel Jansen¹, Zachary Glaros¹, Laura Barger⁵, Amanda Lamp⁶, Hannah Baumgartner⁷, Thomas Nesthus⁷, Cassie Hilditch⁸

¹NASA Ames Research Center, ²San Jose State University, ³San Jose State University Research Foundation, ⁴Menlo College, ⁵Brigham and Women's Hospital & Harvard Medical School, ⁶Washington State University, ⁷Federal Aviation Administration, ⁸Central Queensland University

Introduction: Short-haul airline operations often require pilots to operate irregular schedules that encroach on the biological night. These schedules can impact sleep, and in turn, alertness, fatigue, and cognitive performance, which introduces a potential safety risk. There are many regulatory limits and industry practices that have been established to mitigate such impairments, but few studies have examined the impact of such schedules. Therefore,

we aimed to evaluate the impact of circadian disruption on these outcomes during short-haul operations.

Methods: Participants included commercial passenger operations pilots from four US airlines. Data were collected 1-3 days before and after two trip types: one involving circadian disruption (i.e., one or more duties encroaching on 0000 and 0659) and one without circadian disruption (i.e., all duties scheduled between 0700 and 2359). Data included continuous actigraphy and daily sleep logs. Participants completed a five-minute Psychomotor Vigilance Task (PVT), Karolinska Sleepiness Scale (KSS), and Samn-Perelli fatigue scale (SP) 3x/day on days off; and after waking, pre-duty, at top-of-descent for each flight, post-duty, and before bed on duty days. Data were collected using the NASA PVT+ application on an iPod. We used RStudio (Version 2023.6.1.524) to compare outcomes with mixed-effects models, adjusted for multiple comparisons using the Benjamini-Hochberg procedure.

Results: In all, 159 participants provided valid data across 1,921 flights over 2,406 days. We found small but significant differences between circadian disrupted and non-disrupted trips with greater sleepiness (KSS: 4.77 ± 2.16 vs. 4.43 ± 2.11 , $p < .001$, $d = 0.20$), greater fatigue (SP: 3.64 ± 1.38 vs. 3.37 ± 1.34 , $p < .001$, $d = 0.25$), slower PVT speed (1000/reaction time; 3.86 ± 0.63 vs. 3.94 ± 0.61 , $p < .001$, $d = -0.27$) and less total sleep time (6.30 ± 1.69 h vs. 6.78 ± 1.28 h, $p < .001$, $d = -0.29$).

Conclusion: Our findings suggest that there is a small but significant cost to working during the biological night that remains even when prescriptive limitations and existing airline mitigations are in place.

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0170

ASSOCIATION BETWEEN OBJECTIVE METRICS OF VIGILANT ALERTNESS AND NON-RESTORATIVE SLEEP: IMPLICATION FOR THE ROLE OF GLYMPHATIC CLEARANCE

Hiroo Wada¹, Mathias Basner², Takeshi Tanigawa³

¹Juntendo University Graduate School of Medicine, ²University of Pennsylvania, ³Department of Public Health, Juntendo University Graduate School of Medicine

Introduction: We recently demonstrated that psychomotor vigilance test (PVT) metrics are associated with psychological health [Wada H, J Sleep Res, 2025], although the neurological mechanisms underlying these associations remain unclear. A recent study reported that impaired glymphatic clearance (GC) after 24-hour sleep deprivation was more strongly associated with vigilant lapses, or the number of slower reactions, than with reaction time, as assessed by PVT [Einspanner E 2025]. Because impaired GC is linked to depression [Deng Z. 2025] and may contribute to non-restorative sleep (NRS) [Hauglund NL. 2025], we hypothesized that NRS would be associated with PVT metrics, particularly with attentional lapses. The aim of this study was therefore to examine associations between PVT metrics and NRS.

Methods: In this sub-analysis of the National Survey for the Work Style Reform of Long-Working Physicians in Japan, 1,082 participants with complete PVT and traffic-accident data were included. NRS was assessed with the question, "How often have you had restorative sleep per week over the past 30 days?" Responses were coded as: never (0), 1 day (1), 2 days (2), and ≥ 3 days per week (3), and treated as a continuous variable. Physicians also reported their average sleep duration over the test week. A brief computerized 3-min PVT was administered after their shift, and PVT metrics, including mean reaction time (RT), lapses, and the PVT-likelihood ratio metric (PVT-LRM), were derived. Covariates included age, sex, body constitution, sleep duration, and the PVT testing time. Univariable and multivariable linear regression models were used.

Results: NRS was significantly associated with mean RT, lapses, and PVT-LRM. The association between NRS and lapses remained significant and robust after adjustment for sleep duration and PVT testing time (estimate [95% CI]: 0.015 [0.003–0.027], $p < 0.05$). Because sleep duration and testing time are indicators of sleep insufficiency, these results suggest that NRS is associated with vigilance lapses independently of sleep insufficiency, whereas the association between NRS and RT appears to be mediated by sleep insufficiency.

Conclusion: NRS was significantly associated with vigilant lapses and reaction time on the PVT, but with distinct patterns. This dissociation may possibly reflect impaired glymphatic clearance differently.

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0171

FATIGUE RISK MANAGEMENT IN AVIATION: OPTIMAL PLANNING OF SLEEP OPPORTUNITIES DURING 24-HOUR LAYOVERS THROUGH BIOMATHEMATICAL MODELING

Cole Sekedat, Rachael Muck, Mark McCauley, Hans Van Dongen
Sleep and Performance Research Center, Washington State University Health Sciences Spokane

Introduction: When switching between daytime and nighttime flying or during transmeridian trips, flight crew may encounter layovers that are ~ 24 h in duration. Managing sleep during these layovers is challenging: Sleeping early helps to recover from the prior duty period, while sleeping late helps to prepare for the next one, and circadian rhythmicity constrains when sleep is possible. We used computer simulations based on the two-process model (TPM) of sleep/wake regulation to explore optimal 24h layover sleep strategies.

Methods: We simulated all possible sleep schedules during 24h layovers with 4h–8h total sleep opportunity, scheduled in 1h increments as consolidated sleep opportunity or split between two sleep opportunities of ≥ 2 h duration and ≥ 2 h apart. For each simulated sleep schedule, and for all possible layover start times in 1h steps, we tracked the homeostatic and circadian processes of the TPM across the 24h layover and a subsequent 12h duty period. Initial homeostatic sleep pressure at the layover start was assumed to be 0.62 or 0.85 (moderate or considerable prior

wakefulness). Evaluated at 30min resolution, the model marked when sleep would occur during the scheduled sleep opportunities, based on homeostatic pressure exceeding the lower TPM circadian threshold (i.e., sleep was biologically plausible). The model also flagged when, outside of scheduled sleep opportunities, homeostatic pressure exceeded the upper circadian threshold (i.e., effort required to stay awake). Additionally, we calculated the peak level of sleepiness (homeostatic sleep pressure minus circadian wake pressure) during the subsequent 12h duty period.

Results: Among all simulated 24h layover sleep schedules the most (compared to least) effective ones yielded $\sim 25\%$ – 50% reductions in peak sleepiness during the subsequent 12h duty period. For ≥ 6 h total sleep opportunities, irrespective of 24h layover start time, optimal sleep scheduling involved split sleep with one sleep period near the start and another near the end of the layover. For ≥ 7 h total sleep opportunities, regardless of initial homeostatic state (0.62, 0.85), none of the optimal sleep schedules were flagged as requiring effort to stay awake.

Conclusion: Biomathematical simulations for scheduling of sleep during 24h layovers suggest that optimal planning entails ≥ 7 h, split sleep opportunities.

Support (if any): Federal Express Corporation

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0172

SCROLLING PAST BEDTIME: HOW SMARTPHONE USE LIMITS SLEEP IN ELITE ADOLESCENT ATHLETES

Flynn Crosbie¹, Pierre Vernel¹, Damien Léger², Mathieu Nedelec¹

¹INSEP (French National Institute of Sport, Expertise and Performance), ²Paris Cité University, VIFASOM (Vigilance, Fatigue, Sleep and Public Health)

Introduction: Elite adolescent athletes typically experience insufficient sleep. Demanding schedules limit sleep by imposing early morning wakes, and late bedtimes. In addition, increasing evening screen use, particularly on smartphones, may further restrict sleep by delaying bedtime. Our objective was to examine these behaviours more closely by investigating how adolescent athletes used their smartphones and how this affected their sleep.

Methods: Twenty-nine male rugby athletes (16.4 ± 0.7 years) were followed for two and a half months. Sleep was assessed daily using actigraphy. Smartphone use was monitored objectively through daily screenshots of their "screen usage", allowing the quantification of total screen time, type of use (social media, entertainment, video games), and timing of use throughout the day. Each athlete also underwent two polysomnography recordings spaced three weeks apart to assess sleep architecture.

Results: Athletes spent an average of 5.88 ± 2.17 h/day on their phones, ranging from 3.91 ± 1.03 h to 8.16 ± 2.33 h. Weekday use (5.66 ± 2.04 h) was lower than weekend use (7.47 ± 2.36 h, $p < 0.001$). The majority of screen time was dedicated to social media (80.9%), followed by entertainment (9.1%), video games (4.5%), and other applications (5.5%). Each additional hour of smartphone use was associated with a delayed bedtime ($+5.7$ min/h, $p < 0.001$). This association was much stronger when use occurred in the late evening (20:00–03:00), producing a delay of $+34.4$ min/h (p

< 0.001). Late use was also associated with a reduction in total sleep time (−35.8 min/h, $p = 0.0017$) and a higher proportion of deep slow-wave sleep (N3) (+3.35%, $p = 0.028$).

Conclusion: Adolescent elite athletes spend substantial amounts of time on their smartphones, primarily on social media. The most significant effects concern late-evening use, which is associated with delayed sleep onset, reduced sleep duration and changes in sleep architecture, highlighting the increased sleep-debt. These findings indicate that the timing of use matters more than total use, and highlight the importance of limiting late-night screen exposure to preserve sleep rhythms and recovery in young athletes.

Support (if any):

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0173

DEPLOYMENT OF A NOVEL SLEEP SELF EFFICACY QUESTIONNAIRE IN A COHORT OF ADULT USERS OF WEARABLE SLEEP TRACKERS

Logan Schneider, Guln Tuzcuoglu, Adrian Celaya, Jinming Yu, Conor Heneghan
Google

Introduction: Subjective assessments of sleep behaviors provide meaningful insight into an individual's sleep experiences and may augment objective metrics. We developed a novel, 24-item tool for assessing self-efficacy in influencing sleep related behaviors and outcomes, called the Sleep Efficacy for Sleep Health (SE4SH). This questionnaire considers self-perceived abilities to control caffeine/alcohol intake, timing of exercise, cope with unwanted wakefulness, and other factors. The SE4SH was deployed as part of a study on free-living sleep in a cohort of wearable users.

Methods: Users of Fitbit wearables participated in a 4-week assessment of sleep under normal free-living conditions in early 2025. At the onset of the trial, users completed the SE4SH questionnaire along with the PROMIS sleep disturbance (SDI) and sleep-related impairment (SRI) questionnaires. Basic demographic and wearable-reported sleep parameters were recorded over the study duration.

Results: A total of 3,453 users completed the surveys ($F=2468/M=981/Other=3$, Age=50.3±13.7 yrs, BMI=28.8±6.2). The average raw SE4SH score was 75.9 (on a 24-120 scale). Men reported significantly higher scores than women (78.3 vs 74.9, $p < 0.05$, Cohen's $d=0.2$). The mean PROMIS T-scores for SDI (mean=51.6) and SRI (mean=52.3) indicate a population with mild sleep concerns compared to the expected population average (mean of 50). Lower SE4SH scores correlated negatively with both SDI ($r=-0.31$) and SRI ($r=-0.29$), demonstrating that reduced self-efficacy is consistently associated with poorer subjective sleep quality and daytime function. Age had a mild positive association with SE4SH ($r=0.05$), while a higher bed time variability showed a negative correlation ($r=-0.13$).

Conclusion: The SE4SH is a promising survey that reliably captures a person's beliefs about controlling their sleep outcomes. The observed associations with established subjective metrics (SDI and SRI) and objective markers (main sleep duration and bed-time variability) are consistent with the hypothesis that reduced self-efficacy leads to poorer sleep outcomes.

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0174

NIGHT-NIGHT ACROSS AMERICA: A NATIONAL SLEEP FOUNDATION SURVEY OF PARENT-REPORTED CHILD SLEEP ROUTINES

Alysa Miller, John Lopos, Joseph Dzierzewski
National Sleep Foundation

Introduction: Consistent and supportive bedtime routines are critical to good sleep health in childhood, with long-term implications for physical, cognitive, and emotional well-being. Specific routines, tools, and behaviors American parents use to support their children's wind-down to sleep are underexplored and not well understood. This study aimed to characterize common bedtime practices during a typical night among U.S. families with children.

Methods: A random, nationally representative survey of 926 U.S. parents of children ages 0-13 years old, including an oversample of Black and Hispanic respondents, was administered online in English or Spanish. Parents provided demographic information and identified specific aspects of bedtime routines commonly used with their child. Descriptive statistics quantified the proportion of parents reporting various bedtime activities used during their child's routine.

Results: The most commonly reported elements of children's bedtime routines were using room darkening or blackout curtains (49%), reading a book before bed (46%), and turning on a nightlight (37%). A large proportion of parents also reported using a sound machine (41%) or saying a prayer before bed (27%). Fewer parents reported singing a song before bed (26%), using sleep-monitoring technology (22%), or playing music or stories on a device (18%). Of note, twenty percent of parents reported laying in their child's bed until their child falls asleep, while 15% reported staying in their child's room until their child falls asleep. In terms of co-sleeping behavior, 17% of parents share their bed with their child for the full night, 14% share their bed at the beginning of the night, and 11% say their child enters their bed at some point during the night.

Conclusion: Findings reveal American parents engage in a variety of bedtime wind-down practices with their children, where reading a book, using a nightlight, and darkening the room are most common. Less frequently reported, though still prevalent, behaviors included using sleep-monitoring technology, playing music, and several co-sleeping arrangements. These insights provide more understanding of contemporary bedtime routines for the American child and may inform responsive guidance and interventions to support good sleep health in early childhood and for the broader family unit.

Support (if any):

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0175

PARENTAL IMPLEMENTATION OF CBTI FOR PEDIATRIC INSOMNIA: COMPONENTS TRIED AND ROLE OF PROVIDER RECOMMENDATION IN TYPICALLY DEVELOPING CHILDREN

Melanie Stearns¹, Francheska Martinez¹, Micah Mazurek², Jessica Page³, Jennifer Takagishi¹, Patricia Emmanuel⁴, Judith Owens³, Christina McCrae¹

¹University of South Florida, ²University of Virginia, ³Boston Children's Hospital, ⁴Morsani College of Medicine

Introduction: Behavioral sleep recommendations are widely recognized as first-line strategies to improve pediatric sleep. In addition, understanding parent engagement with behavioral sleep recommendations is critical for designing interventions that are both effective and accessible. However, little is known about the extent to which parents adopt behavioral sleep recommendations, why they do not adopt them, and the importance of a health care provider's recommendations to adopt them. This study seeks to fill that gap.

Methods: Parents ($N=389$, $Mage=37.85$, 51.9%-female) of school-aged children (8-12, $Mage=9.40$, 45.5%-female) with sleep problems (>30 minutes of SOL or WASO on >3 nights in the past week) reported on their past experiences using behavioral sleep recommendations to improve their child's sleep and the importance of a health care professional's recommendations (0-10, with 10 being the most important). SPSS evaluated the proportion of parents who reported prior use of specific behavioral sleep recommendations and mean importance of recommendations.

Results: Sixty percent of parents reported trying behavioral sleep recommendations. Among these, nearly all instituted a regular bedtime (100%) and schedule (89%), with many directing children to avoid electronics (83%), changing unhelpful habits (75%), and rewarding good bedtime behavior (65%). Parents who had not tried recommendations cited barriers such as perceived ineffectiveness (5%), travel demands (2%), lack of insurance coverage (2%), limited access to virtual options (2%), or not receiving recommendations (2%). Importantly, parents emphasized the value of provider endorsement ($M=7.35$, $SD=2.40$).

Conclusion: Findings suggest that while many parents adopt behavioral sleep recommendations, barriers remain related to access, perceived effectiveness, and provider endorsement. Future research should explore strategies to increase equitable access to behavioral sleep interventions, including integration into routine pediatric care and use of telehealth/online platforms. Clinically, results underscore the importance of health care professionals actively recommending behavioral sleep strategies, as provider endorsement strongly influences parent uptake. Expanding provider training and embedding behavioral sleep guidance into standard practice may improve child sleep outcomes and reduce family burden.

Support (if any):

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0176

SLEEP RESTRICTION IN ADOLESCENTS ALTERS CAREGIVER-CHILD DISCREPANCY IN DETECTING ADOLESCENT FATIGUE

Luna Sato¹, Gina Mason², Kathleen O'Hara², Claire Mayew Sherman¹, Grace Kupka¹, David Barker², Daniel Dickstein³, Mary Carskadon², Jared Saletin²

¹E.P. Bradley Hospital Sleep Research Laboratory, ²Psychiatry and Human Behavior, Alpert Medical School of Brown University,

³Psychiatry, Harvard Medical School

Introduction: Adolescents are susceptible to insufficient sleep due to competing bioregulatory and social pressures, with consequences for daytime fatigue. In the context of attention-deficit/hyperactivity disorder (ADHD), caregivers may misconstrue fatigue and ADHD traits. We examined how caregivers and youth differ in detecting the impact of sleep restriction on adolescent fatigue and sleep disturbances.

Methods: Data were analyzed from 50 adolescents (range: 10.1-15.7 [12.3±1.6] years; 25F) who completed two counterbalanced at-home 5-night sleep conditions: sleep optimization (SO; 10h TIB) vs. sleep restriction (SR; 7.5h TIB). Both caregiver and child completed the PROMIS short form evaluating youth fatigue and sleep disturbances after each sleep schedule. ADHD traits were indexed by Conners 3 T-scores for inattention (range: 40-90; 64.28±14.29) and hyperactivity-impulsivity (range: 40-90; 65.59±17.35). Linear mixed models assessed interactions and main-effects of condition (SO vs. SR), respondent (caregiver vs. child), and ADHD traits (separate models for inattention and hyperactivity-impulsivity), on PROMIS T-scores.

Results: We identified a significant condition-by-rater interaction for fatigue T-scores ($F(1,130.6)=4.54$, $\beta=4.04$, $p=.035$). After SR, caregivers rated child fatigue higher than adolescent self-report (caregiver: 49.05±8.83; adolescent: 44.19±7.83; ($F(1,130.7)=9.30$, $\beta=-4.91$, $p<.01$); this distinction was not present after SO (caregiver: 43.82±7.30; adolescent: 42.95±8.85; ($F(1,130.7)=9.30$, $\beta=0.87$, $p>.05$). For sleep disturbances, we only identified a main-effect of rater (adolescent>caregiver; caregiver: 52.62±8.52, adolescent: 62.72±3.25; ($F(1,132.8)=139.6$, $\beta=-10.09$, $p<.001$) with no interaction of rater by condition or main-effect of condition ($ps>.05$). ADHD symptoms did not moderate any findings (all $ps>.05$).

Conclusion: Caregivers rated higher adolescent fatigue after sleep restriction compared to adolescents' self-report; raters did not differ after sleep optimization. Caregivers rated lower levels of sleep disturbances compared to youth overall. These effects indicate that sleep restriction amplifies a discordance between adolescents' experience of fatigue and their caregivers' perception of that experience. These data join a larger literature indicating potentially incongruent self-perception of the consequences of sleep loss.

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0177

IMPACT OF BLUE-LIGHT BLOCKING GLASSES ON PERCEIVED SLEEP QUALITY IN COLLEGE STUDENTS WITH POOR SLEEP QUALITY

Jane Poinsette, Kate Batterson, Dharmik Namineni, Rachael Rice, Jonathan Conrady, Jessica Green, Alexandria Reynolds
University of South Carolina

Introduction: Evening exposure to blue light from electronics can disrupt circadian rhythms and worsen sleep quality. College students frequently use screens before bed, often experiencing poor sleep, increased daytime sleepiness, and reduced alertness as a result. Blue-light blocking glasses with amber lenses block this light from reaching the eyes and may support a healthier circadian timing and lessen downstream effects. Past studies indicate improvements in sleep quality, sleep efficiency, and daytime alertness when glasses are worn before bed. This study examines the impact of evening use of amber glasses on self-reported sleep factors in college students with poor sleep quality.

Methods: Six undergraduate students (male=3; mean age=19.83, $SD=1.47$ years) who reported poor sleep quality (global screening scores ≥ 5 and/or sleep efficiency scores $\leq 82\%$ on the Pittsburgh Sleep Quality Index, PSQI) completed one week of typical sleep (baseline). The following two weeks, participants wore amber glasses two hours prior to bedtime. Participants wore a wrist

actigraph (Philips Respironics) to measure time in bed (TIB) and total sleep time (TST). After both baseline and intervention periods, participants completed surveys examining demographics, depression, anxiety, and stress symptoms (Depression Anxiety Stress Scale), sleepiness (Epworth Sleepiness Scale), fatigue (Multidimensional Assessment of Fatigue), and sleep quality (PSQI).

Results: Preliminary paired t-tests showed significant increases in TIB (Baseline=484.3 min, Intervention=537.0 min, $t(5)=-4.871$, $p=.005$) and TST (Baseline=398.5 min, Intervention=447.5 min) after the intervention ($t(5)=-5.527$, $p=.003$). PSQI global scores improved from 9.17 (SD=3.25) at baseline to 5.00 (SD=1.67) after the intervention ($t(5)=-2.751$, $p=.040$). Moderate effect sizes indicated improvements in subjective reports of sleep efficiency (PSQI-derived, Baseline=71.69%; Intervention=86.73%, $d=-0.589$), fatigue (Baseline=24.56; Intervention=21.38 $d=0.525$), and sleepiness (Baseline=6.50; Intervention=4.33, $d=0.469$). Depression and anxiety symptoms did not significantly change.

Conclusion: These preliminary findings indicate that wearing amber glasses prior to bed may increase sleep duration and improve subjective sleep quality. While not significant, effect sizes for sleep efficiency, fatigue, and sleepiness imply that students may have experienced better sleep and reduced next-day symptoms when using the glasses. More data are needed to draw definitive conclusions, but amber glasses may offer an accessible and inexpensive method to improve sleep.

Support (if any):

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0178

PHONE USE PATTERNS SURROUNDING SLEEP ONSET AND OFFSET IN COLLEGE STUDENTS

Penelope Hollister¹, Katie McCullar¹, Andrew McHill², Akane Sano³, Rebecca Robbins⁴, Melissa St. Hilaire⁵, Andrew Phillips⁶, Charles Czeisler⁷, Elizabeth Klerman¹

¹Massachusetts General Hospital, ²Oregon Health & Science University, ³Department of Electrical and Computer Engineering, Rice University, ⁴Division of Sleep Medicine, Harvard Medical School, ⁵Merrimack College, ⁶College of Medicine and Public Health, Flinders University, ⁷Brigham and Women's Hospital

Introduction: Measuring sleep timing information through passive phone-usage metrics could increase sample sizes and reduce participant burden for clinical and research use. A required step is evaluating how phone-based measures compare with established methods. We investigated the relationship between phone usage and recorded sleep-onset and offset timing across 30 days in college students.

Methods: 202 college students (35% Female) completed 30 days of at-home monitoring with wrist actigraphy, daily sleep diaries, and phone-usage tracking. All screen-on events longer than 10 secs (to reduce notification-only events) were identified and averaged in 10-minute bins within a 5-h window surrounding both sleep onset and offset times, not including naps, as defined using actigraphy and sleep diaries. For each participant, phone use within this time window was normalized, mean phone use during the 30 min before and after each transition was calculated, and paired t-tests were run. To evaluate whether the difference scores could

identify sleep onset or offset, we determined the percentage of participants whose scores exceeded one standard deviation from the mean difference across each transition.

Results: At sleep onset, mean phone use dropped from 7.5% $\pm$ 4.0 (SD) in the 30 minutes before to 1.1% $\pm$ 1.4 after ($p<.001$). At sleep offset, phone use increased from 2.6% $\pm$ 1.6 before to 5.3% $\pm$ 2.0 after ($p<.001$). Mean difference scores were -6.4 $\pm$ 4.2% for sleep onset and 2.7 $\pm$ 2.8% for sleep offset. Only ~65% of participants for sleep onset and ~55% for sleep offset had differences in percentage use within one standard deviation of the mean: ~35% or ~45% (respectively) of participants had differences outside this range.

Conclusion: As expected, phone use showed a clear group-level shift across sleep-wake transitions. However, large individual differences limit the ability to use these difference scores for classifying sleep onset or offset on an individual level. Phone-use difference scores around sleep transitions based on these methods are not yet reliable individual-level markers of sleep timing in this population. Higher-resolution data and personalized normalization may improve predictions.

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0179

SLEEP, LIGHT EXPOSURE, AND MENTAL HEALTH IN UNDERGRADUATE STUDENTS

Miles Azuma-Hall¹, Andrew Hou¹, Phyllis Zee², Kathryn Reid¹

¹Northwestern University, ²Northwestern University Feinberg School of Medicine

Introduction: Many college students exhibit irregular sleep timing and late chronotype, which have been associated with worse mental health and lower academic performance. However, less is known about environmental and behavioral factors that affect these relationships. The SELF-A assesses students' self-efficacy beliefs regarding their use of specific self-regulatory processes related to academic functioning. This project aims to assess the relationship of lifestyle and behavioral factors (sleep, outdoor light exposure, and physical activity) with academic self-efficacy in undergraduates.

Methods: Undergraduate students living on campus and aged 18-23 completed an online survey between 10/2/2025-11/20/2025. Questionnaires included: demographics, academic self-efficacy (SELF-A), RUSATED sleep health, Light Exposure Behavior Assessment (LEBA), Godin Leisure-Time Exercise questionnaire (GLTEQ), Center for Epidemiologic Studies-Depression scale (CES-D), Generalized Anxiety Disorder-7 survey (GAD-7). Micro Munich Chronotype (μ MCTQ) determines chronotype from mid-sleep on free-days corrected for sleep debt (MSFsc).

Results: Data available for 108 students who completed the survey (73.9% Female, 38% White, 13% Black, 40.7% Asian) with mean age of 18.5 years (SD=0.80). Participants included 51.9% with clinically significant depressive symptoms, 36.1% classified as having moderate or severe anxiety symptoms, 55.6% of the sample classified as late or very late chronotypes, and 80.6% in the active category. SELF-A correlated with RUSATED ($r=0.375$, $p<.001$), LEBA outdoor factor scores ($r=0.240$, $p=0.014$), GAD ($r=-0.451$, $p<.001$), CES-D ($r=-0.516$, $p<.001$), and MSFsc ($r=-0.257$, $p=0.007$). LEBA outdoor factor scores correlated with GLTEQ

scores ($r=0.255$, $p=0.011$), and LEBA phone factor and GAD scores ($r=0.200$, $p=0.040$). RUSATED measures correlated with LEBA phone factor scores ($r=-0.237$, $p=0.015$) and GAD scores ($r=-0.293$, $p=0.003$). Multiple regression model indicates that lower SELF-A is associated with lower RUSATED ($p<0.001$), with a trend for outdoor light ($p=0.057$).

Conclusion: Higher academic self-efficacy was associated with better sleep and a trend for higher outdoor light exposure, but not physical activity. Notably, worse mental health, later sleep timing, and light from a phone around the sleep period were also associated with poor SELF-A. Future steps include confirming these patterns with objective light and sleep measures to help develop targeted interventions enhancing light exposure and sleep hygiene among undergraduates.

Support (if any): Center for Circadian and Sleep Medicine, Feinberg School of Medicine.

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0180

BEHAVIORAL CHANGES IN EXECUTIVE CONTROL OVER THE COURSE OF SLEEP DEPRIVATION

Luciana Antezana, Michael Grandner, William Killgore
University of Arizona

Introduction: Sleep deprivation (SD) impairs cognitive performance, but its specific effects on executive function remain less well understood. In this study, we analyzed Go/No-Go (GNG) task data to examine how sustained attention (Go Accuracy; GA) and inhibitory control (No-Go Accuracy; NGA) change over the course of SD, and whether these changes can be explained by declines in vigilance, as measured by Psychomotor Vigilance Test (PVT) performance.

Methods: Forty-five healthy adults (ages 20-43) underwent a 28-hour period of SD. During SD, participants completed a GNG task four times and performed 17 hourly PVTs. PVT1 (baseline) was administered at 19:00 (Day 1) and PVT16 at 10:00 (Day 2). PVT16 was chosen over PVT17 for being closer to GNG4 time. Data were analyzed using repeated-measures ANOVA, with PVT change (PVT16 minus baseline) included as a covariate to control for vigilance decline.

Results: For GA, the main effect of Time ($p = .027$) indicated that GA significantly declined across the SD period. A significant Time $\times$ PVT change interaction ($p < .001$) and a significant Between-Subjects PVT effect ($p = .021$) showed that declines in PVT performance predicted lower overall GA and that this relationship varied across time. For NGA, the main effects of Time ($p = .029$), Time $\times$ PVT change interaction ($p = .040$) and Between-Subjects PVT ($p = .016$), were also significant. These findings indicate that participants with greater PVT decline showed lower overall NGA and that the strength of this relationship depended on the time of day during SD.

Conclusion: Sustained attention and inhibitory control both declined over the course of sleep deprivation, and these impairments were strongly linked to individual differences in vigilance loss, with participants showing greater PVT decline exhibiting larger reductions in Go and No-Go accuracy. However, deficits persisted even after controlling for vigilance, indicating that sleep deprivation impairs executive processes directly and not solely through reduced alertness.

Support (if any):

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0181

CHARACTERISTICS AND RELIABILITY OF THE BEST SLEPT SELF® QUESTIONNAIRE: A NEW MEASURE FOR HEALTHY SLEEP BEHAVIORS FROM NATIONAL SLEEP FOUNDATION

Alexander Erickson¹, Spencer Nielson¹, Natalie Dautovich², John Lopus¹, Joseph Dzierzewski¹

¹National Sleep Foundation, ²Virginia Commonwealth University

Introduction: The Best Slept Self® Questionnaire (BSSQ) is a 10-item self-report measure of healthy sleep behaviors based on National Sleep Foundation's Best Slept Self® framework. Developed with input from national experts in sleep health, the BSSQ is designed to assess frequency of healthy sleep behaviors, including daytime and nighttime behaviors, in the general population. This study explored general characteristics and reliability of the BSSQ across national samples of adolescents and adults.

Methods: We analyzed data from three random, nationally representative samples collected through probability-based random sampling, which included data from 2,391 adults collected in 2023 ($n = 1,042$) and 2024 ($n = 1,349$), as well as 1,138 adolescents collected in 2023. Each sample completed the 10-item BSSQ along with demographic, sleep health, and other questionnaires. Descriptive statistics and reliability analyses, including Cronbach's alpha and greatest lower bound (GLB), were conducted.

Results: Across adult samples, a majority of people reported engaging in most healthy sleep behaviors more days than not (i.e., at least 4 days per week), including regular bedtimes (69.5%), waketimes (80.7%), and mealtimes (59.9%). Similar results were found in adolescents, where the majority reported regular bedtimes (70.8%), waketimes (86.2%), and mealtimes (70.7%) at least 4 days per week. Of all healthy sleep behaviors, however, a majority of adults (57% - 59.5%) and teens (70%) reported never putting away electronic devices an hour before bed. Across adult samples, reliability analyses indicated adequate to optimal reliability estimates ($.72 \leq a \leq .73$, $.77 \leq glb \leq .83$). Similar ranges of reliability estimates were found in the adolescent sample ($a = .71$, $glb = .77$).

Conclusion: Findings provide evidence supporting the reliability of the BSSQ across U.S. adults and adolescents. The typical U.S. adolescent and adult reported engaging in most healthy sleep behaviors on more days than not; however, use of electronic devices before bed remains a very common behavior. This work informs continued exploration of the psychometric and practical applications of the BSSQ as a tool to serve public sleep health.

Support (if any): This work was supported by the National Sleep Foundation.

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0182

DERIVING LEXICON FROM COMMUNITY WORD USAGE: A SOCIAL LISTENING ANALYSIS OF "BRAIN FOG" IN CENTRAL DISORDERS OF HYPERSOMNOLENCE

Zachary Cline¹, Anne Morse², Frederick Ascencion³, Matthew Horsnell⁴, Jennifer Gudeman⁵, Judy Fallon⁵, Christopher DeFelice¹, Maria Picone¹

¹TREND Community, ²Geisinger Medical Center, Janet Weis Children's Hospital, ³Patient Author, ⁴Project Sleep, ⁵Avadel Pharmaceuticals

Introduction: The term "brain fog" lacks clear definition and is likely interpreted differently across conditions, between individuals, and between patients and clinicians. Using social listening, we analyzed 14 years of central disorders of hypersomnolence (CDH) community discussions to reveal authentic patient experiences and evolving lexicon of brain fog for the sleep community.

Methods: We analyzed 554,312 documents (posts/comments) from 2 subreddits (r/narcolepsy and r/idiopathichypersomnia) and a private Facebook group (PWN4PWN) using vector semantics to determine words often used in the context of "brain fog" as well as phrases used in a similar way to "brain fog". Usage of these phrases was compared over two timespans: historical (2011-2015) and recent (2017-2025). Documents were also run through a proprietary analytics engine that recognizes mentions of clinical findings as well as their relation to the author (eg, actually experienced, hypothetical) in social media text.

Results: Analysis revealed context words most associated with "brain fog" were "clears", "forgetfulness", "lifted", "memory", "fatigue", "drunkenness", "dissociation", "concentration", "cognitive", and "constant". The top 40 similar phrases included synonyms (eg, "fog", "mental fog", "foggy") and symptom descriptions like "difficulty concentrating", "inability to focus", "poor memory", "forgetfulness", and "lethargy". The yearly proportion of documents using "brain fog" and related "fog" words grew steadily until 2017 and has been consistently >1% of documents thereafter. The proportions of documents using "brain fog" and "fog" has significantly increased between the historical and recent period, while those using "memory loss", "memory problems", and "mental fog" have significantly decreased (all $P < 0.02$). Associated clinical findings included Memory impairment, Memory dysfunction, and Impaired concentration.

Conclusion: This social listening analysis demonstrates that these online CDH communities primarily associate "brain fog" with memory impairment. The community's linguistic evolution captured across 14 years suggests the community organically develop shared language that evolved from memory-related phrases to "brain fog." The methodology delivers real-world evidence at community scale, offering unique insights into authentic patient experiences that are difficult to capture through traditional research purposes.

Support (if any): Avadel Pharmaceuticals

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0183

DEVELOPMENT OF A LICENSE-FREE SLEEP SELF-EFFICACY SURVEY FOR CONSUMER SLEEP HEALTH COACHING TECHNOLOGIES

Logan Schneider¹, Michelle Jonelis², Conor Heneghan¹, Thuan Dang³, Timothy Wong⁴, Benjamin Graef⁵, Narayan Krishnamurthy⁶

¹Google, ²Lifestyle Sleep, ³Shriners Children's Chicago, ⁴Loma Linda University, ⁵Summa Physicians, ⁶Medamerica Consulting

Introduction: Self-efficacy is a critical determinant of successful behavioral modification across various health domains, yet current measures of sleep-related self-efficacy are outdated and limited primarily to clinical insomnia treatment. The existing Sleep Self-efficacy Scale (SSES), developed in 1987, does not

reflect the comprehensive, health-focused behavioral strategies (eg, nutrition, technology use, schedule management) targeted by modern sleep health and coaching interventions. Given the many steps along the sleep-health coaching journey, developing a new, validated self-efficacy scale is thus essential for accurately assessing a key dimension of the "effectiveness" of sleep-health coaching interventions, offering a valuable complement to traditional outcomes, such as changes in common sleep metrics (eg, TST).

Methods: Following initial construction of a survey instrument covering topics relevant to sleep health coaching, a modified Delphi approach involving four rounds of anonymous Delphi surveys and a panel discussion with Sleep Medicine and Coaching experts was used to garner feedback and consensus on the domains and items that compose the Self-efficacy for Sleep Health (SE4SH) scale.

Results: The modified Delphi process resulted in a scale composed of 24 items relevant to sleep health coaching interventions. Domain coverage spanned sleep science principles of homeostatic sleep regulation, circadian rhythms, psychophysiologic hyperarousal, and external influences. All RuSATED sleep health domains were accounted for, including additional differentiation of the Efficiency domain into topics related to falling asleep, staying asleep, and early morning awakening.

Conclusion: The Self-efficacy for Sleep Health (SE4SH) scale is a license-free survey of sleep self-efficacy that may be helpful in assessing baseline self-efficacy and/or changes in self-efficacy related to sleep health coaching interventions.

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0184

EFFECTS OF OLFATORY STIMULI ON VIGILANCE AND SLEEPINESS DURING SLEEP INERTIA: PRELIMINARY RESULTS

Shreya Varrier¹, Chloe Lambert¹, Sarah Thomas², Eliza Van Reen³, Caroline Gredvig-Ardito¹, Mary Carskadon¹

¹E.P. Bradley Hospital Sleep Research Laboratory, ²Psychiatry and Human Behavior, Alpert Medical School of Brown University,

³Circadian Positioning Systems, Inc.

Introduction: Sleep inertia is a transient period of impaired function upon waking and poses risks for workers who must act quickly after abrupt arousal. We examined whether exposure to an arousing odorant upon waking is associated with greater vigilance and less sleepiness compared to no odorant.

Methods: Thirteen adults (10F, mean age 25 ± 3.7 range 21-35 years) completed 2 nights of PSG-monitored sleep with four arousals, each after 5 minutes of continuous slow-wave or REM sleep. Participants were exposed to no odor or a proprietary scent blend (PSB) designed to stimulate the trigeminal system via room diffusion in a counterbalanced within-subjects design. The odorant was delivered throughout each 20-minute arousal from 30 seconds beforehand. Vigilance was measured with two 5-minute Psychomotor Vigilance Tests (PVT; variables: mean

reaction time (RT) and lapse count) occurring 1 and 11 minutes into the arousals. Participants completed a Visual Analog Sleepiness Scale (VASS) at minute 17. Separate linear mixed models with random intercept for participants predicted PVT and VASS variables from odor condition, accounting for night and arousal number. PVT models included a variable for PVT number within arousals interacted with odor condition to test whether PSB accelerated task performance relative to no odor.

Results: A trend was seen for faster RTs in the PSB condition vs. null (PSB: $M=679.5 \text{ ms} \pm 609.5$; Null: $M=858.9 \text{ ms} \pm 1047.0$), $b = -173.31$, $SE = 90.44$, $t(172.65) = -1.93$, $p = .057$. Night 2 ($b = 446.86$, $p < .001$) and later arousals ($b = 93.19$, $p = .018$) had significantly slower RTs. For lapses, Night 2 ($b = 3.56$, $p < .001$), later arousals ($b = 1.19$, $p = .001$), and timing (first vs. second) ($b = -1.89$, $p = .02$) were significant predictors. For VASS, Night 2 was associated with lower subjective sleepiness (VASS: $M=84.2 \pm 9.5$; (Null $M=82.6 \pm 14.7$); ($b = -4.28$, $p = .025$). No interactions were significant.

Conclusion: PSB exposure during nocturnal arousals showed a trend toward improved vigilance (faster RT) but not reduced sleepiness. These findings contribute to limited research on whether olfactory stimulation can mitigate sleep inertia.

Support (if any): RI Commerce Corporation; P20GM139743

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0185

FATIGUE IS ATTRIBUTABLE TO BELIEFS AND PERCEPTIONS RATHER THAN OBJECTIVE SLEEP QUALITY

Noah Love, Ruda Lee, Colin Echeverri, Nayeli Nunez Cruz, Philip Gehrman
University of Pennsylvania

Introduction: While it is intuitive to assume that daytime fatigue is a function of sleep quantity and quality, the observed relationship between sleep and fatigue is not so straightforward. Evidence suggests that fatigue is more strongly related to retrospective accounts of sleep quality than to objectively assessed metrics of sleep. The current study explores the relationships between subjectively-reported fatigue with insomnia, dysfunctional beliefs about sleep, and objective sleep metrics, assessed via polysomnography (PSG), in individuals with insomnia symptoms. **Methods:** Within an ongoing study, 63 participants with insomnia symptoms (61.9% female; mean age = 35.61, $SD = 7.46$) completed measures of insomnia, beliefs about sleep, and fatigue. Participants also provided one night of at-home PSG recording. The YASA sleep-staging algorithm was used to derive sleep onset latency (SOL), wake after sleep onset (WASO), total sleep time (TST), and sleep efficiency (SE) from PSG recordings.

Results: Fatigue severity significantly predicted dysfunctional beliefs about sleep ($r = .456$, $p < .001$) and subjectively assessed insomnia severity ($r = .414$, $p < .001$). In contrast, fatigue was not significantly related to SOL ($r = .236$, $p = .074$), WASO ($r = -.068$, $p = .601$), TST ($r = .222$, $p = .083$), or SE ($r = .037$, $p = .781$). We compared a regression model with subjective insomnia and beliefs about sleep to a model that also included PSG variables. The subjective-only model explained 27.5% of the variance in fatigue severity ($R^2 = .275$), and the subjective+objective model increased the explained variance to 39.9% ($R^2 = .399$), yielding a modest, statistically significant improvement in model fit ($\Delta R^2 = .124$; $F(4, 50) = 2.59$, $p = .048$). In the full model, TST was the only significant objective predictor ($p = .042$).

Conclusion: Preliminary findings indicate that dysfunctional beliefs about sleep and subjectively-reported insomnia predict fatigue severity better than objectively assessed sleep criteria. This suggests that fatigue, when subjectively reported, is more a function of beliefs and subjective experiences than the objective quality of sleep, although TST did contribute incremental predictive value. Future research should include objective measures of fatigue severity and consider moderators of the sleep/fatigue relationship.

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0186

HOW MUCH IS SLEEP WORTH? A PSYCHOMETRIC ASSESSMENT OF MONETARY SLEEP VALUATION

Abigail Woolley, Brandon Pattillo, Davis Paxton, Bryce Beeton, Dustin Sherriff-Clayton, Kara M. Duraccio, Daniel Kay
Brigham Young University

Introduction: Sleep is essential for health and wellbeing, yet people rarely assign sleep an explicit monetary value. Although societal-level economic models quantify the costs of insufficient sleep, little is known about how individuals themselves value sleep gains or losses. Using the Sleep Value Item Bank 2.0 (SVIB-2.0) we previously identified five sleep value profiles: Unconcerned, Appreciative, Ambivalent, Devaluing, and Concerned. This study examined how people monetarily value their own sleep using the Monetary Sleep Value Questionnaire (MSVQ). We evaluated the MSVQ's factor structure and assessed how monetary sleep valuation relates to demographic characteristics and the SVIB-2.0 sleep-value profiles.

Methods: This secondary analysis used data from the SRVIV survey study. Adults ($N=455$) across the continental US completed demographics questions (age: $M=45 \pm 17$; 53% female; 82% White; education: Mdn =some college; 50% married), the SVIB-2.0, and the MSVQ. The MSVQ contained eight items assessing how much participants would need to be paid to give up increasing amounts of sleep and eight items assessing how much they would pay for guaranteed increases in sleep quality (each ranging from one hour to one hour nightly for life). We tested associations between monetary sleep valuation, demographics, and the SVIB-2.0 using latent profile analysis.

Results: Factor analyses supported a two-factor MSVQ structure reflecting willingness to pay for sleep versus compensation required to give up sleep. Latent profile analysis revealed meaningful associations ($p < .05$): older age predicted lower compensation demands for sacrificing sleep, and higher income predicted greater compensation expectations. Individuals with the Sleep Devalue profile required less money to give up sleep, whereas those with the Sleep Appreciate profile were willing to pay more for better sleep.

Conclusion: Findings support the MSVQ as a psychometrically sound measure capturing how individuals economically value their own sleep. Monetary valuation appears to reflect distinct aspects of sleep value, meaningfully associated with demographic and sleep-value profiles. Integrating economic perspectives into sleep health research may offer novel insights for designing interventions that emphasize the personal sleep values.

Support (if any):

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0187

INVESTIGATING THE INFLUENCE OF DAILY SLEEP DISTURBANCES AND BIOPSYCHOSOCIAL INFLUENCES ON DAILY PAIN IN CHRONIC PAIN PATIENTS

Britani Holland¹, Matthew Moore¹, Michael Robinson², Roland Staud², Jason Craggs¹, Ashley Curtis³, Kevin McGovney⁴, Mattina Davenport⁵, Jasmine Berry⁶, Marlee Richardson¹, Pradeep Sahota⁷, Siva Chokkalingam⁷, Christina McCrae¹

¹University of South Florida, ²University of Florida, ³Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ⁴Malcolm Randall Veterans Affairs Medical Center, ⁵Nationwide Children's Hospital, The Ohio State University, ⁶Mayo Clinic, ⁷University of Missouri

Introduction: Daily fluctuations in sleep disturbances have been shown to shape pain experiences among individuals with chronic pain. Additional biobehavioral factors, such as abuse history, depression, current and long-term anxiety, opioid use, physical functioning, and fatigue, may also affect daily pain outcomes. Yet the extent to which these factors collectively contribute to daily pain intensity and unpleasantness remains insufficiently understood.

Methods: Using baseline data from the SPINII randomized controlled trial (R01NR017168; McCrae, PI), women with insomnia and fibromyalgia (N = 294, x̄ age = 40) completed 14 days of sleep diaries assessing sleep onset latency (SOL), wake after sleep onset (WASO), total sleep time (TST), and pain intensity and unpleasantness (0–100). Additional predictors included abuse history, Beck Depression Inventory (BDI), State-Trait Anxiety Inventory (STAI), and PROMIS-57 physical functioning and social functioning. Linear mixed models examined the effects of sleep and related factors on daily pain.

Results: Significant predictors of pain intensity included higher between-person SOL ($b = 0.08$, $p < .001$) and WASO ($b = 0.08$, $p < .001$), lower between-person TST ($b = -0.10$, $p < .001$), lower within-person TST ($b = -0.03$, $p < .001$), opioid use ($b = 2.84$, $p = .029$), poorer physical functioning ($b = -0.35$, $p = .008$), and higher depression scores ($b = 0.20$, $p = .046$). Pain unpleasantness showed nearly identical patterns, with only physical functioning becoming non-significant. Random intercepts and residual variance values were significant in both models ($p < .001$), indicating within- and between-person variation in pain. ICCs of .80–.85 revealed that the majority of variance was between-person, while non-significant autocorrelations ($p > .05$) indicated minimal day-to-day carryover effects beyond stable individual differences.

Conclusion: Overall sleep quality and emotional health shape pain experience more strongly than daily fluctuations. Although TST offers some next-day relief, chronic contributors are more relevant to daily pain. Effects were largely consistent; between- and within-person TST showed strong effects, and depression had a slightly larger effect on pain unpleasantness than pain sensitivity, reinforcing a multidimensional biopsychosocial pain process. These findings highlight the need for integrated

interventions that strengthen sleep, emotional well-being, and physical functioning.

Support (if any): NIDA

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0188

MONITORING SLEEP, MISSING THE MARK: PUBLIC USE AND PERCEPTIONS OF SLEEP-TRACKING TOOLS FROM NATIONAL SLEEP FOUNDATION RESEARCH

Alysa Miller, Alexander Erickson, John Lopos, Joseph Dzierzewski
National Sleep Foundation

Introduction: Understanding perceptions of sleep technologies is important as usage grows. Attitudes may vary widely, especially between adults using sleep trackers for themselves versus parents using trackers for their children. Consumer beliefs and behaviors can affect usage rates among the general population and remain under explored in the literature—particularly for children. This is important because sleep measurement can be tied to decisions and practices in the household. This study sought to explore current rates of sleep tracker use for adults and children and associated attitudes.

Methods: National Sleep Foundation surveyed a random, nationally representative sample of 2,145 U.S. adults and 926 parents, oversampled for Black and Hispanic adults. The survey assessed current/past/future usage of electronic devices or apps to track adults' and children's sleep, privacy concerns about user data, and confidence in sleep tech and apps, broadly, to improve sleep. Descriptive statistics were used to summarize results.

Results: Twenty percent of adults currently use sleep-tracking technology for themselves. Among current nonusers, 16% reported previous use of sleep trackers and 27% reported being likely to adopt such technology in the future. However, 54% of adults expressed concerns about data privacy when using sleep trackers and more than half (52%) lack confidence in technology and apps to improve sleep. In comparison, only 8% of parents currently use sleep-tracking devices for their children. Among current nonusers, 8% reported previously using sleep trackers for their children and only 11% reported being likely to consider future use. Fifty percent of parents expressed concerns about potential intrusions into their child's privacy. The majority of parents (73%) are skeptical about the ability of sleep technology and apps to improve their child's sleep.

Conclusion: Adults report modest but likely increasing use rates of sleep-tracking technologies for themselves, with lower trends for their children. Concerns about data privacy for sleep trackers and skepticism regarding the potential of technology and apps, generally, to improve sleep represent opportunities for increased awareness and education. Our findings underscore the need for greater transparency about data privacy and usage, evidence-based validation for technologies, and trusted independent third-party recognition for meeting important benchmarks.

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0189

PHYSIOLOGICAL EFFECTS OF CO-SLEEPING: A LARGE-SCALE ANALYSIS OF PARTNER INFLUENCE ON SLEEP COMPOSITION AND CARDIOVASCULAR RECOVERY

Emma Cary, Sofie Jacobsen, Megan Holm, David He, Nicole Moyaen
Eight Sleep Inc.

Introduction: Co-sleeping is common among adults; however, the physiological effects remain poorly quantified at scale. Prior at-home studies rely on self-report, while existing in-lab studies are limited to < 25 participants. The Eight Sleep Pod (Pod), a smart mattress cover that tracks biometrics for each side of the bed, provides a unique opportunity to evaluate partner-sleep effects using large-scale real-world data.

Methods: We retrospectively analyzed 4,043 adults (2,189 female; 1,854 male) across 238,288 nights of sleep between August and November 2025. The Pod objectively detects partner presence, heart rate (HR), heart rate variability (HRV), total sleep time (TST), sleep stages, and snoring. Members in this dataset were required to have ≥ 10 partner nights and ≥ 10 solo nights. Partner-solo differences were assessed using FDR-corrected paired t-tests, sex effects with Welch's t-tests, and Pearson correlations assessed relationships between co-sleeping frequency and objective changes. All data below are reported as means $\pm$ SD with Cohen's d effect sizes.

Results: In this dataset, members slept with their partner on average for $67\% \pm 18\%$ of nights. Sleeping with a partner increased HRV by 8.0% ($+2.5 \pm 7.0$ ms, $d = 0.36$) and total sleep time by 1.8% ($+6.39 \pm 34.78$ min, $d = 0.18$; both $P < 0.001$). Women showed larger HRV improvements than men when co-sleeping ($+10.2 \pm 18.2\%$ vs. $+5.5 \pm 15.3\%$, respectively; $d = 0.20$; $p < 0.001$). Overall changes in HR, sleep stages, and snoring were all statistically significant ($P < 0.01$), but not physiologically meaningful (e.g., < 1 bpm change in heart rate or $< 2\%$ change in sleep stages). The percentage of days spent co-sleeping did not modify outcomes.

Conclusion: Co-sleeping enhances HRV, and modestly increases total sleep time. Women show larger HRV gains when co-sleeping, suggesting women might experience a larger parasympathetic effect when their partner is near. Future studies should explore why women benefit from co-sleeping more than men, and how age, relationship stability, and relationship duration shape these effects.

Support (if any): Eight Sleep Inc. funded this research.

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0190

PSYCHOMETRIC PROPERTIES OF A NOVEL SELF-EFFICACY FOR SLEEP HEALTH QUESTIONNAIRE

Conor Heneghan, Logan Schneider, Hamsa Subramaniam
Google

Introduction: Self-efficacy scales are useful predictors of behavioral outcomes. In sleep, Lacks proposed a first self-efficacy scale in 1987 which has been widely studied. Recognizing the need for an updated instrument to address modern lifestyle and technology constraints, we developed the Sleep Efficacy for Sleep Health (SE4SH), a novel 24-item questionnaire assessing perceived

confidence in controlling sleep-related factors and behaviors (e.g., caffeine intake, exercise timing).

Methods: Users of Fitbit wearables were invited to participate in an IRB-approved, 4-week-long assessment of sleep under normal free-living conditions in early 2025. At the onset of the trial, users were asked to complete the SE4SH questionnaire as implemented within the Fitbit mobile app. Basic demographic information was recorded, as well as wearable reported sleep parameters over the duration of the study. Psychometric assessment was based on a set of hypothesized five underlying factors (F1–F5) - (F1) diet and substance intake, (F2) exercise and light exposure, (F3) schedule and routine control, (F4) knowledge in dealing with sleep problems, and (F5) technology/environment control. Psychometric performance was assessed with Cronbach's α , and convergent and discriminant validity of the identified factors.

Results: 3453 unique users completed the surveys and reported valid demographic data (F=2468/M=981/Other=3, age=50.3 $\pm$ 13.7, BMI 28.8 $\pm$ 6.2). The average raw score reported on the SE4SH questionnaire was 75.9 (on a 24-120 scale). Men reported a higher raw score than women (78.3 vs 74.9, $p < 0.05$, Cohen's $d = 0.2$). Raw scores were highest on efficacy around alcohol/caffeine choices, with lowest scores on knowing how to address difficulty staying asleep. The overall survey had Cronbach's α of 0.945 (individual component α s: 0.65-0.93). Discriminant validity was also good, with inter-group correlations ranging from 0.42-0.78, illustrating that the groupings reflected distinct aspects of self-efficacy.

Conclusion: The Sleep Efficacy for Sleep Health (SE4SH) is a promising novel 24-item survey that captures aspects of a person's beliefs about their confidence in controlling sleep-related factors and behaviors, and has been demonstrated to have appropriate psychometric properties in an initial deployment with users.

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0191

PSYCHOMOTOR VIGILANCE AND SLEEP ACROSS THE MENSTRUAL CYCLE

Kathryn Kennedy¹, Vanshikha Vij¹, Brooklyn Nunes¹, Skyler Kieffer¹, Matthew Larger¹, Alisa Huskey¹, David Negelspach¹, Jung won Cha¹, Sara Nowakowski², William Killgore¹

¹University of Arizona, ²Baylor College of Medicine

Introduction: Sleep and cognitive performance have been shown to fluctuate across the menstrual cycle, but findings to date have been largely inconsistent and often compare menstrual phases between individuals, rather than measuring intraindividual differences. To address this gap, we tracked sleep and psychomotor vigilance throughout one complete menstrual cycle.

Methods: Eighteen premenopausal females (ages 18-36) with natural menstrual cycles tracked their sleep at home using actigraphy and daily sleep diaries. Individuals were asked to complete a maximum of 5 psychomotor vigilance tasks (PVT) per day (9am, 12pm, 3pm, 6pm, 9pm). PVT reaction time, total sleep time (TST), sleep onset latency (SOL), wake after sleep onset (WASO), and self-reported sleep quality (SQ) were z-scored for each person across the menstrual cycle. K-means clustering was used on mean-level summary metrics (including PVT amplitude, highest and lowest reaction time days, and sleep parameters), and cluster differences evaluated using mixed effects models with participant as a random effect.

Results: PVT performance varied significantly across the menstrual cycle, with substantial variability between-participants. Three clusters were identified: cluster 1 showed slower PVT reaction time during the follicular phase, cluster 2 showed slower PVT reaction time mid-cycle, and cluster 3 showed slower PVT reaction time during the luteal phase. Mixed effects models were used to determine the interaction between sleep variables and PVT performance. Better SQ predicted faster PVT reaction times across participants ($\beta = -0.17$, $p = 0.031$). However, this did not vary between clusters. Longer SOL was significantly associated with PVT reaction time for cluster 1 ($\beta = +0.261$, $p < 0.001$), but not for clusters 2 or 3.

Conclusion: These data suggest that there may be no one-size-fits-all relationship between menstrual phase, psychomotor vigilance, and sleep. Rather, there may be distinct phenotypes that give rise to phase-specific cognitive performance that varies between individuals. Further work is required to comprehensively measure cognition, sleep, and hormone status in a larger sample of premenopausal females.

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0192

SLEEP BASELINE FOR D1 FOOTBALL ATHLETES

Olivia Engstrom, Brandon Ysasaga, Zane Harkness, Eliza Young, Dustin Sherriff, Kara M. Duraccio
Brigham Young University

Introduction: Sleep is essential for physical recovery, cognitive functioning, and overall well-being, yet collegiate athletes experience significant sleep disturbance. Given limited research on elite athlete sleep, this study aims to establish a baseline for D1 football players' sleep quantity, quality, caffeine use, and self-reported mental health to inform targeted interventions and support future research.

Methods: A questionnaire was administered to 114 members of a Division I football team. Demographic measures included age, childhood economic status, and ethnicity. Other factors that were measured included caffeine consumption, chronotype, and total sleep disturbance (Athletic Sleep Screening Questionnaire; ASSQ).

Results: Descriptive analyses characterized the sample of 114 athletes (age = 21.18, weight = 234.43 lbs), with diverse racial representation and predominantly middle class childhood SES. ANOVAs examined how caffeine use and mental health, analyzed in separate models, correlated with the measured sleep-related factors. Poorer mental health was associated with higher sleep disturbance ($p < .001$) and later chronotype patterns ($p = .048$). Adjusted $R^2 = .235$, signifying that the model accounted for 23.5% of variance in mental health scores. No significant correlates with caffeine use were found.

Conclusion: Sleep is essential for health and performance, yet collegiate athletes commonly experience inadequate or disturbed sleep. Prior literature establishes that football players are at higher risk of sleep disturbances such as insomnia symptoms and sleep-disorder breathing. Higher sleep disturbance and later chronotype patterns appear to be correlated with self-reported mental health. This indicates that sleep timing and sleep hygiene may be the most effective sleep interventions to impact the mental health of football players. These patterns indicate both behavioral and physiological contributors. Establishing this baseline supports targeted sleep-health interventions, enhances

performance and recovery, and provides a foundation for future research on sleep, mental health, and modifiable factors in elite athletes.

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0193

SLEEP VALUE IS NOT STABLE: HOURLY FLUCTUATIONS AND THEIR ASSOCIATION WITH INSOMNIA SYMPTOMS

Brandon Pattillo, Daniel Kay
Brigham Young University

Introduction: Sleep value is the relative worth individuals place on sleep and may be a critical component in understanding decisions made around sleep and the daily experience of sleep disorders. Previous studies have linked sleep value to individual traits and broader personal value systems, yet it remains unclear how sleep value fluctuates across the day or shifts in relation to momentary sleep-wake intentions. The current study presented a novel method of measuring monetary sleep value across the 24-hour day and aimed to characterize how monetary sleep value relates to daily activities and insomnia symptoms.

Methods: Undergraduates ($N=45$) completed a baseline survey of demographics and sleep-related information including the Insomnia Severity Index (ISI) grouping participants as insomnia vs no insomnia ($ISI < 10$). They then completed the Sleep Value State Questionnaire (SVSQ) once each hour for twenty-four consecutive hours reporting their intended activity for the next hour (sleep or stay awake). If intending to sleep, they reported how much they would need to be paid to stay awake; if intending to stay awake, how much to attempt to sleep. They also reported sleepiness and how much they would pay for a quality hour of sleep. Mixed-design repeated-measures ANOVAs assessed within-person differences by planned activity and between-person differences by insomnia severity.

Results: Significant time effects emerged for sleepiness and the monetary value of a quality hour of sleep, peaking at \$20 at 4 a.m., $F(5.62, 236.08) = 13.95$, $p < .001$. Participants placed higher monetary value on sleep when it conflicted with their planned state, requiring \$25 to do the opposite, $F(1,42) = 54.85$, $p < .001$, partial $\eta^2 = .57$. They were willing to pay more for quality sleep when planning to sleep ($M = \$20$) versus stay awake ($M = \$3$). Insomnia did not significantly affect monetary sleep value.

Conclusion: These findings show that perceived sleep value is dynamic, rising sharply during the biological night and further when aligned with immediate intentions. Planned state strongly influences sleep valuation, whereas insomnia status does not. Circadian timing and momentary goals both shape how people prioritize and value sleep.

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0194

SLEEP REGULARITY DURING EXTREME SHIFTWORK IS IMPORTANT FOR MOOD AND SUBJECTIVE SLEEP QUALITY

Jacob Guzzetti¹, Panagiotis Matsangas², Siobhan Banks¹, Nita Shattuck²

¹University of South Australia, ²Naval Postgraduate School

Introduction: Maritime defence watchstanders adhere to demanding shiftwork schedules (“watchbills”) for extended periods at sea which can pose a challenge to sleep and wellbeing. Previous research examining the impact of different watchbill configurations on sleep have relied on sleep duration. Findings have highlighted insufficient sleep during watchstanding but have mixed results when comparing across watchbills. Sleep regularity is important dimension of sleep that has been rarely assessed in shiftworking populations but presents a potential new metric that could help inform watchbill selection. This study investigated sleep regularity assessment as a tool for evaluating watchbills, using a recently introduced metric – the Sleep Regularity Index (SRI).

Methods: Wrist-worn actigraphy-derived sleep was assessed in Navy active-duty sailors during underway for ~8 days. (Study 1) N=218 sailors from five groups (3hr-on/9hr-off [3/9], 6/18, 7/5/5/7, and 5/15 watchstanders, and dayworkers) were compared based on SRI using Kruskal-Wallis tests. (Study 2) N=24 sailors stood watch on the 5/10, then the 3/9 ~four months later. Performance was assessed using 3-min psychomotor vigilance task (PVT) throughout both underway periods. Subjective sleepiness, sleep quality, and mood were assessed at the end of underway using the Epworth Sleepiness Scale (ESS), Pittsburgh Sleep Quality Index (PSQI) and Profile of Mood States (POMS), respectively. Partial correlation analysis was used to examine the relationship of sleep and SRI to ESS, PVT, POMS, and PSQI.

Results: (Study 1) Daily sleep duration was non-significantly different between watchbills (all $p > 0.05$). SRI score was significantly lower for the 5/15 watchbill (43.33, IQR = 10) compared to all other watchbills (all $p < 0.001$). (Study 2) Independent of watchbill, SRI score was associated with PSQI (Spearman's rho [r_s] = -.326) and POMS (r_s = -.361) score, but not PVT or ESS score (all $p > 0.05$). Daily sleep duration was associated with only ESS score (r_s = -.353).

Conclusion: The SRI is a useful new tool for examining sleep regularity across different shiftwork schedules. Sleep duration and regularity are both important dimensions of sleep to be considered with shiftwork schedules and those which protect both are optimal.

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0195

SLEEPLESS PARENTS, RISKY ROADS: NATIONAL SLEEP FOUNDATION'S 2025 SURVEY ON DROWSY DRIVING

Spencer Nielson¹, Alexander Erickson², Alysa Miller², John Lopos², Joseph Dzierzewski²

¹Virginia Commonwealth University, ²National Sleep Foundation

Introduction: Drowsy driving is impaired driving, implicated in 21% of fatal car crashes each year. Drowsy driving is a significant public health and safety concern that goes beyond individual behavior. Families play a vital role in ensuring everyone gets enough quality sleep to drive alert. Familial circumstances, including the number of children in the household, may be related to drowsy driving by parents. This study sought to document and explore the prevalence of drowsy driving in parents of children under 18-years-old.

Methods: National Sleep Foundation (NSF) conducted a random, nationally representative study of 1,913 US adults, including 855

parents of children under 18-years-old. The survey asked about prevalence/frequency of drowsy driving (with options ranging from never having driven drowsy to driving drowsy “most days”), and to rank 4 activities (getting enough physical activity, limiting TV time, eating a healthy diet, and getting enough sleep to drive alert) in order of importance for “keeping you and your family healthy and safe.” Descriptive statistics and tests of proportions were used to summarize prevalence and frequency of drowsy driving among parents.

Results: Despite “getting enough sleep to drive alert” being ranked most frequently by parents as the utmost important activity for keeping themselves and their families safe, 70% of parents reported having ever driven drowsy. The proportion of parents with one child (64%) or multiple children (72%) who reported having driven drowsy was significantly higher than the proportion of nonparents (56%; p 's $< .05$). For frequency, the proportion of parents with multiple children reporting that they drive drowsy at least monthly (22%) was significantly higher than the proportion of non-parents (12.8%; $p < .05$).

Conclusion: Drowsy driving is widespread among families with children under 18-years-old. Parents of multiple children are at the highest risk of drowsy driving, with 1 in 5 reporting driving drowsy at least monthly. Familial obligations and circumstances may put parents at higher risk of drowsy driving. However, families can be a key support system to prevent drowsy driving, through prioritizing sleep, helping educate about the dangers of drowsy driving, and encouraging family members to avoid this highly risky behavior after insufficient sleep.

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0196

LATE AND IRREGULAR SLEEP-WAKE SCHEDULES INCREASE SLEEP PROPENSITY AND IMPAIR NEUROBEHAVIORAL PERFORMANCE, BUT NOT SUBJECTIVE SLEEPINESS IN THE MORNING

Shauni Omond¹, Leilah Grant¹, Cassie Hilditch², Melissa St. Hilaire³, Charles Czeisler¹, Elizabeth Klerman⁴, Shadab Rahman¹

¹Brigham and Women's Hospital and Harvard Medical School,

²Central Queensland University, ³Merrimack College,

⁴Massachusetts General Hospital

Introduction: While irregular sleep schedules are associated with poorer academic performance, delayed circadian timing, and adverse health, causal evidence remains limited. We conducted a randomized trial to probe the effects of sleep regularity on morning sleep propensity, neurobehavioral performance, and subjective sleepiness.

Methods: Healthy adults ($n=25$, 9F, mean $\pm$ SD age: 27.2 $\pm$ 3.8 years) completed a 26-day inpatient protocol that included an initial 24-hour baseline day, followed by 21 days on a randomized Early Regular (ER), Late Regular (LR), or Irregular (IR) sleep-wake/dark-light schedule, a subsequent 30-hour interval of 90-minute “ultradian days”, and a final 24-hour recovery day. Each randomized sleep-wake/dark-light schedule was based on observed schedules from a study in college students. Schedules were selected for regularity based on the Sleep Regularity Index being >80 for ER and LR schedules or < 60 for the IR schedule, and for timing as either Early (ER: scheduled sleep midpoint 3:57 $\pm$ 0:39 h) or Late (LR: 6:29 $\pm$ 0:40; IR: 7:01 $\pm$ 1:58). Morning sleep propensity, the primary outcome, was measured using polysomnography-assessed sleep

onset latency (SOL) averaged across sleep episodes scheduled at 7:30, 9:00, and 10:30. At 08:30 and 11:30, neurobehavioral performance was measured by a 10-minute PVT, with attentional failures (reaction time >500 ms) as the primary endpoint, and subjective sleepiness was assessed using a visual analogue scale.

Results: Schedule significantly impacted sleep propensity and attentional failures (both, $p < 0.03$) but not sleepiness ($p = 0.50$). Compared to the ER schedule, which was associated with, on average, the longest SOL (29.32 ± 4.76 minutes), SOL was significantly shorter in IR schedules (11.22 ± 1.66 minutes, $p < 0.01$) but not in LR schedules (18.74 ± 4.25 minutes, $p = 0.11$). There were significantly fewer attentional failures in the ER compared to the LR ($p < 0.01$) and IR schedules ($p < 0.03$).

Conclusion: An early regular schedule is associated with lower sleep propensity and better neurobehavioral performance in the morning compared to late and irregular schedules. Increased morning sleep propensity and neurobehavioral performance impairment associated with late and irregular schedules was not recognized, since concomitant self-reported sleepiness scores did not differ among schedules; this has implications for behavior changes, learning, and safety.

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0197

SLEEP GOAL-FOCUSED ONLINE ACCESS TO LIFESTYLE SUPPORT (GOALS) TRIAL: AN INTEGRATED POSTPARTUM SLEEP, DIET, AND PHYSICAL ACTIVITY INTERVENTION

Marquis Hawkins, Kathleen McTigue, Kaleab Abebe, Namhum Kim, Mariska Goswami, Rya Clifton, Christina Personnette, Judy Chang, Daniel Buysse, Esa Davis, Michele Levine
University of Pittsburgh

Introduction: Postpartum weight retention contributes to long-term cardiometabolic risk. Postpartum diet and physical activity

interventions yield modest effects on weight, with sleep, an essential determinant of weight, often overlooked. This study evaluated the feasibility, acceptability, and preliminary efficacy of Sleep GOALS, an online postpartum intervention integrating strategies to address sleep, diet, and physical activity.

Methods: This two-arm, 16-week pilot trial randomized participants (2–7 months postpartum; BMI 25–40 kg/m²) to Sleep GOALS or an educational brochure. Feasibility benchmarks were: enrollment of 40 participants over 1 year, $\geq 30\%$ from racially diverse backgrounds, 80% retention at follow-up, and 80% of participants completing $\geq 70\%$ of 16 modules. Acceptability benchmarks were mean scores $\geq 4/5$ on a survey assessing understanding, implementation, and barriers. Secondary outcomes included changes in weight, sleep, physical activity, diet, and maternal psychosocial functioning. Analyses included descriptive statistics and linear mixed-effects models. Mean differences (MD) were calculated as intervention minus control.

Results: Forty individuals were enrolled, with 20% from racially diverse backgrounds. Study retention was 70%. On average, participants completed 72% modules. Acceptability was high, with most lessons rated >4 for ease of understanding, implementation, and minimal barriers. The intervention resulted in a greater proportion achieving $\geq 5\%$ weight loss (36% vs. 23%). Between-group differences favored the intervention for total active time (MD = -44.22 min/day; $d = -0.46$) and light-intensity activity (MD = -28.64 min/day; $d = -0.32$). Sleep continuity (improvement favored the intervention, including wake after sleep onset MD = 0.52 hr/day; $d = 0.59$; number of awakenings MD = 3.17; $d = 0.82$), and improved sleep regularity (MD = -5.54 points; $d = -0.35$). The control included larger increases in total duration (MD = 0.56 hr/day; $d = 0.33$) and greater reductions in perceived stress (MD = 4.45 points; $d = -0.31$). Depressive symptoms, functioning, and diet quality improved similarly across groups.

Conclusion: Sleep GOALS demonstrated strong acceptability and produced encouraging signals of efficacy for physical activity and sleep continuity indicators. Recruitment and retention did not meet a priori benchmarks, highlighting opportunities to strengthen trial procedures before testing in a fully powered RCT.

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0198

BIDIRECTIONAL PREDICTORS BETWEEN BASELINE AND RECOVERY SLEEP AND DNA STRAND BREAKS DURING SLEEP DEPRIVATION AND PSYCHOLOGICAL STRESS

Namni Goel¹, Maria Moreno-Villanueva², Lauren Pasetes¹¹Rush University Medical Center, ²University of Konstanz

Introduction: We have previously shown that DNA strand breaks change during total sleep deprivation (TSD) and psychological stress. We determined whether baseline sleep measures predicted endogenous DNA strand breaks (ESB), which occurred during normal aerobic metabolism, and radiation-induced DNA strand breaks (ISB), which occurred from blood cells irradiated ex vivo, during TSD and psychological stress. We also assessed whether these markers predicted recovery sleep measures.

Methods: We conducted a five-day experiment under highly controlled conditions in 15 healthy adults (ages 29-52; 6 females). DNA strand breaks via blood samples were collected: 1) after two baseline 8h time-in-bed (TIB) nights (B1, B2); 2) during TSD morning (TSD AM; after 25h of TSD); 3) during TSD evening following a modified Trier Social Stress Test, which induced psychological stress (TSD PM; after 34h of TSD); and 4) after two recovery nights of 8-10h TIB (R1, R2). Wrist actigraphy assessed sleep indices during the B2 and R1 nights. Simple linear regression assessed predictive relationships between B2 and R1 sleep metrics and TSD AM and TSD PM ESB and ISB. Simple linear regression also was conducted in males and females separately for significant main results. $p < 0.05$ was significant.

Results: Later B2 sleep offset significantly predicted lower TSD PM ESB ($r = -0.670$; $\beta = -1.684$), explaining 44.9% of the overall variance, and 59.9% ($r = -0.774$; $\beta = -2.492$) of the variance in males. Notably, B2 sleep measures did not significantly predict TSD ISB. In addition, greater TSD AM ISB significantly predicted longer R1 sleep duration ($r = 0.536$; $\beta = 10.289$), explaining 28.7% of the overall variance, and 81.8% ($r = 0.904$; $\beta = 31.069$) of the variance in females. By contrast, TSD ESB did not significantly predict R1 sleep measures.

Conclusion: For the first time, we demonstrate that baseline sleep offset predicted ESB during TSD and psychological stress, explaining a high percentage of the variance, particularly in males, but did not predict ISB. By contrast, ISB, but not ESB during TSD and psychological stress predicted recovery sleep duration explaining a high percentage of the variance, particularly in females. Our results underscore crucial relationships, mechanisms and molecular biomarkers between sleep health and radiation-induced and endogenous DNA strand breaks.

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0199

BIDIRECTIONAL PREDICTORS BETWEEN BASELINE AND RECOVERY SLEEP AND MOOD DURING TOTAL SLEEP DEPRIVATION

Lauren Pasetes, Namni Goel

Rush University Medical Center

Introduction: We previously reported that later baseline sleep onset and sleep midpoint significantly predicted lower Profile of

Mood States-Fatigue (POMS-F) scores during total sleep deprivation (TSD) overall and in females; however, fatigue scores did not significantly predict recovery sleep indices. To extend these findings, we determined whether baseline sleep measures obtained the night before TSD predicted POMS subscales related to affective and somatic (vigor) components during TSD, and whether these subscales predicted sleep measures during recovery.

Methods: We conducted a five-day experiment under highly controlled conditions in 32 healthy adults (ages 27-53; 14 females) comprised of two baseline 8h time-in-bed (TIB) nights (B1, B2), approximately 39h of TSD, and two recovery nights of 8-10h TIB (R1, R2). The POMS-Vigor (POMS-V), POMS-Tension (POMS-T), POMS-Confusion (POMS-C), POMS-Anger (POMS-A) and POMS-Depression (POMS-D) subscales and the POMS-Total Mood Disturbance (POMS-TMD), which is an aggregate score, were collected at 0400h, 1130h, and 1730h during TSD and each subscale was averaged. Wrist actigraphy assessed sleep indices during the B2 and R1 nights. Simple linear regression assessed predictive relationships between B2 and R1 sleep metrics and TSD POMS subscales. Simple linear regression also was conducted in males and females separately for significant main results. $p < 0.05$ was significant.

Results: Later B2 sleep offset significantly predicted lower TSD POMS-TMD ($r = -0.419$; $\beta = -3.891$) and lower TSD POMS-T scores ($r = -0.368$; $\beta = -0.481$), explaining 13.5%-17.6% of the variance. B2 sleep offset was not a significant predictor of these scores in males or females separately. By contrast, B2 sleep metrics did not significantly predict TSD POMS-V, POMS-C, POMS-A, or POMS-D scores. Notably, none of the TSD POMS scores significantly predicted R1 actigraphic sleep measures.

Conclusion: Our novel results demonstrate that sleep timing, specifically later B2 sleep offset, predicted lower POMS-TMD and POMS-T during TSD but did not predict other mood or vigor scores. Of note, when assessed separately by sex, B2 sleep offset was not a significant predictor of TSD POMS-TMD and POMS-T. Furthermore, none of the TSD POMS scores predicted subsequent recovery sleep. Overall, our results underscore crucial relationships and biomarkers between sleep timing and mood in healthy adults.

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0200

EPINEPHRINE LEVELS VARY WITH TOTAL SLEEP DEPRIVATION AND RECOVERY AND PREDICT COGNITIVE PERFORMANCE RESILIENCE

Namni Goel, Lauren Pasetes

Rush University Medical Center

Introduction: Sleep loss has been shown to alter catecholamine (epinephrine, norepinephrine, and dopamine) levels. We investigated the effects of baseline sleep, total sleep deprivation (TSD), and recovery sleep on catecholamine measures and determined whether baseline catecholamine concentrations predicted TSD cognitive performance.

Methods: We conducted a five-day experiment under highly controlled conditions in 8 healthy adults (ages 28-42; 3 females). Peripheral catecholamine measures via blood samples were collected: 1) after two baseline 8h time-in-bed (TIB) nights (B1, B2); 2) during 39h of TSD and 3) after two recovery nights of 8-10h TIB (R1,

R2). Cognitive measures including the Digit Symbol Substitution Test (DSST), which measures cognitive throughput, were collected at 0400h, 1130h, and 1730h during TSD and averaged. Repeated measures ANOVAs evaluated catecholamine measures across condition (baseline, TSD, and recovery). For significant condition effects, post hoc analyses with Bonferroni corrections compared each condition. Furthermore, partial eta-squared (η^2) estimated effect size with ranges: 0.01-0.06 (small); 0.06-0.14 (medium); and above 0.14 (large). Simple linear regression analyses evaluated whether baseline catecholamine measures predicted TSD cognitive indices. $p \leq 0.05$ was significant.

Results: Epinephrine concentrations demonstrated a significant condition effect, with a large estimate of effect size [$F(2, 12)=5.295$, $p=0.022$, $\eta^2=0.469$]. Post hoc analyses showed that TSD epinephrine levels were significantly greater than recovery epinephrine levels ($p=0.026$). There were no significant condition effects for norepinephrine or for dopamine concentrations. In addition, higher baseline epinephrine levels significantly predicted higher TSD DSST # correct ($r=0.706$; $\beta=0.075$); by contrast, baseline norepinephrine and dopamine levels did not significantly predict TSD cognitive metrics.

Conclusion: Our novel results demonstrate that epinephrine levels increased with TSD and significantly declined with recovery sleep in healthy adults. By contrast, TSD or recovery sleep did not significantly modify norepinephrine or dopamine levels. Furthermore, higher epinephrine levels at baseline significantly predicted better TSD cognitive throughput, explaining a high percentage of the variance (49.8%). Our findings underscore the critical impact of sleep loss and recovery on epinephrine regulation and demonstrate that baseline epinephrine levels are biomarkers of TSD cognitive resilience.

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0201

INATTENTIVE TRAITS MODERATE THE IMPACT OF SLEEP RESTRICTION ON WAKING ELECTROENCEPHALOGRAPHY POWER IN ADOLESCENTS

Kathleen O'Hara¹, Gina Mason¹, Aashritha Sadu², Claire Mayew Sherman², Luna Sato², David Barker¹, Daniel Dickstein³, Mary Carskadon¹, Jared Saletin¹

¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²E.P. Bradley Hospital Sleep Research Laboratory, ³Psychiatry, Harvard Medical School

Introduction: Insufficient sleep emerges in adolescents due to interacting biopsychosocial factors. Disrupted waking neurophysiology may account for negative outcomes associated with sleep loss. Adolescents with high inattentive traits, like those with attention-deficit/hyperactivity-disorder (ADHD) may be more vulnerable to sleep loss. We investigated the impact of sleep restriction on resting wake EEG and whether inattentive traits moderate its effects.

Methods: After removing data with excessive artifact ($n=13$), we analyzed resting waking EEG from 49 adolescents (Mean age=12.3±1.2 years, range: 10.1-15.7 years, 22M) with varying inattentive traits indexed by parent-rated Conners-3 t-scores

(58.76±14.32, range: 40-90). Participants completed a 5-minute eyes-closed afternoon recording (ZMax EEG headband; 256 Hz; F7-FPz & F8-FPz) after two counterbalanced 5-night conditions: sleep optimization (SO; 10h time-in-bed) and sleep restriction (SR; 7.5 time-in-bed). We computed relative and absolute alpha (8- < 12 Hz), theta (4- < 8 Hz), delta (1- < 4 Hz), and slow (0.5- < 1 Hz) power using multitaper spectral analysis. Linear mixed-effects models tested effects of condition (SR vs. SO) and inattention-by-condition interactions on each age- and sex-residualized spectral estimate.

Results: SR was associated with several changes to the waking EEG relative to SO: lower relative delta ($\beta=-0.37$, $p<.001$) and theta (absolute: $\beta=-0.30$, $p=.006$, relative: $\beta=-0.27$, $p=.022$) power, but higher relative slow power ($\beta=0.33$, $p=.007$). Inattentive traits moderated the effect of SR on relative alpha power ($\beta=0.24$, $p=.037$); specifically, with lower inattentive traits, there was a stronger decrease in relative alpha power from SO to SR. Inattentive traits did not moderate any other effects of SR ($p's>.14$).

Conclusion: These results indicate that sleep restriction alters resting wake EEG in adolescents. Decreases in relative delta and theta power, and increases in slow power, in frontal derivations, may indicate drowsy wakefulness (i.e., slow eye movements); we are currently investigating this hypothesis. These data also indicate that those high inattentive traits may be differentially sensitive to EEG changes, particularly at alpha frequencies. Future directions include examining whether these SR-changes in wake neurophysiology reflect neurobehavioral performance (e.g., attentional lapses).

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0202

SLEEP RESTRICTION ALTERS TIME-VARYING ATTENTION IN ADOLESCENTS: MODERATION BY PARENT-REPORTED ADHD TRAITS

Isabella Wright¹, Claire Mayew Sherman², Luna Sato², Grace Kupka², Aashritha Sadu², Gina Mason¹, Kathleen O'Hara¹, David Barker¹, Daniel Dickstein³, Mary Carskadon¹, Jared Saletin¹

¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²E.P. Bradley Hospital Sleep Research Laboratory, ³Psychiatry, Harvard Medical School

Introduction: Adolescents are exposed to insufficient sleep due to bioregulatory and social pressures. Attention-deficit/hyperactivity disorder (ADHD) may increase vulnerability to the neurobehavioral consequences of this sleep loss. Traditional measures of attention (e.g., median reaction time [RT] from the Psychomotor Vigilance Task [PVT]) do not capture temporal fluctuations in attention. Time-varying analysis of reaction time can better index moment-to-moment slowing or speeding. We tested whether sleep restriction changes the trajectory of PVT responses over time and whether ADHD traits moderate these effects.

Methods: Seventy-eight adolescents (range 10.1-15.7 [12.2±1.4] years; 42F) completed a 10-minute afternoon PVT after two counterbalanced 5-night at-home sleep conditions: sleep optimization (SO; 10h time-in-bed) and sleep restriction (SR; 7.5h time-in-bed). Youth were indexed for ADHD traits by parent-rated Conners-3

T-scores for inattention (range 40-90 [60.1±14.9]) and hyperactivity/impulsivity (range 40-90 [61.4±17.1]). We extracted each PVT response as a reciprocal reaction time ($RRT=1/RT$). Linear mixed models examined whether RT varied across time-on-task (i.e., elapsed time within the PVT), condition (SO vs. SR), and ADHD status (mean-centered Conners T-scores).

Results: We identified a series of effects. A significant interaction of time-on-task and condition ($b=0.012$, $p=.017$) indicated that after SO, RRT slowed across the task ($b=-0.018$, $p=.12$); however, after SR, RRT sped up over time ($b=0.021$, $p=.017$). This time-on-task-by-condition effect was moderated by both inattention ($b=0.056$, $p=.001$) and hyperactivity/impulsivity ($b=0.058$, $p<.001$) traits. In both cases, the effect of sleep condition on time-varying RRT was attenuated in youth with lower ADHD traits.

Conclusion: Sleep restriction altered adolescents' time-varying attention, with responses increasing over time compared to a temporal slowing after sleep optimization. Youth with higher ADHD traits showed a stronger shift toward this speeded pattern, suggesting a distinct response phenotype under sleep loss. The consequences of these effects are not yet clear; however, they may reflect either a compensatory attention in youth with ADHD, or conversely, a shift towards impulsivity. Future analyses will link these data to other brain-behavioral outcomes to better understand these effects.

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0203

PROSPECTIVE ASSOCIATIONS OF LONG COVID WITH SLEEP HEALTH NEARLY 3 YEARS AFTER SARS-COV-2 INFECTION: A STATEWIDE REPRESENTATIVE COHORT STUDY

Soomin Ryu¹, Elizabeth Slocum², Blair Whittington², Luis Zavala Arciniega², Sameera Ahmed³, Nancy Fleischer²
¹University of Missouri, ²University of Michigan, ³Michigan Department of Health and Human Services

Introduction: While many adults with post-acute sequelae of SARS-CoV-2 infection (PASC or Long COVID) experience sleep-related symptoms such as insomnia, fatigue, or nonrestorative sleep, little remains known about the persistence and evolution of these problems over time. This study examined the prospective relationship between PASC and multiple aspects of sleep health—sleep duration, quality, and disturbance—using data from a population-based cohort of Michigan adults with confirmed COVID-19 ($n=2,406$).

Methods: PASC was defined at baseline as self-reported recovery time of ≥ 90 days after initial infection. Sleep outcomes were measured at two follow-up points, 1.5 years (follow-up 1) and 3 years (follow-up 2) after infection. We estimated linear and multinomial logistic regression models for continuous and categorical sleep duration (< 6 , $6-9$ [reference], > 9 hours), respectively. Then, we conducted multinomial logistic regression models for 4-category sleep quality measured across two follow-up points: (1) very good-to-fair at both follow-ups (reference), (2) poor-to-very poor only at follow-up 1, (3) poor-to-very poor only at follow-up 2, and (4) poor-to-very poor at both follow-ups. Finally, we conducted logistic regression models for moderate-to-severe sleep disturbance (vs. none-to-mild). All analyses used longitudinal sampling weights.

Results: Adults with PASC slept significantly fewer hours at follow-up 1 (-0.35 hours; 95% CI: -0.53 , -0.17), but not at follow-up 2 (-0.16 hours; 95% CI: -0.38 , 0.06). Compared with sleeping 6-9 hours, PASC was associated with an increased likelihood of sleeping < 6 hours at both follow-up 1 (adjusted relative risk ratio [aRRR]: 3.27; 95% CI: 2.16, 4.96) and follow-up 2 (aRRR: 1.91; 95% CI: 1.28, 2.85). Additionally, PASC had a strong association with poor-to-very poor sleep quality at both follow-up periods relative to very good-to-fair sleep quality at both follow-up periods. PASC was also associated with a higher odds of moderate-to-severe sleep disturbance at follow-up 2 (aOR: 1.83, 95% CI: 1.33, 2.52).

Conclusion: Future studies should incorporate objective measures to investigate the mechanisms underlying the long-term association between PASC and sleep dysfunction and to inform sleep health strategies.

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0204

SAFE AND SOUND: COUNTY-LEVEL ASSOCIATIONS BETWEEN INSUFFICIENT SLEEP AND GUN VIOLENCE ACROSS THE UNITED STATES

Rebecca Essien, Emily Feldman, Danica Slavish
 University of North Texas

Introduction: Gun violence is a leading cause of injury and death in the United States, with emerging evidence linking community sleep patterns and violence. Prior work in major cities found that greater violence is associated with insufficient sleep, wherein sleep shows a stronger association with violence than mental health issues. This study examined associations between county-level insufficient sleep, childhood opportunity, and gun violence across all US counties.

Methods: We analyzed gun violence incidents from The Trace's Atlas of American Gun Violence (1/1/2022-9/30/2025) across 2,186 US counties (all 50 states plus Washington DC). Outcomes included injuries (range: 0-2,440), deaths (range: 0-609), domestic violence incidents (range: 0-331), and drive-by shootings (range: 0-1,379), summed to the county level and merged with 2022 data from the 2025 release of CDC PLACES (insufficient sleep prevalence) and the Childhood Opportunity Index (version 3.0-2023; Noelke et al., 2025). Negative binomial regression models with population offset were used to estimate incident rate ratios (IRR) of violence outcomes.

Results: Counties with a higher prevalence of insufficient sleep had a 5.1% increased rate of injuries per percentage point increase of insufficient sleep (95% CI [1.037-1.065]), a 5.7% increased rate of drive-by shootings (95% CI [1.035-1.080]), and a 1.9% increased rate of domestic violence incidents (95% CI [1.007-1.030]). Prevalence of insufficient sleep was not associated with deaths (95% CI [0.997-1.017]). Higher childhood opportunity was protective across all violence outcomes (IRRs: 0.986-0.989, all $p < 0.001$).

Conclusion: County-level insufficient sleep is associated with higher gun violence, particularly injuries. These findings extend prior city-focused research and suggest community sleep and

neighborhood conditions may be promising targets for violence prevention.

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0205

SLEEP RESTRICTION SUPPRESSES SLEEP SPINDLES BUT PRESERVES SLOW-WAVE ACTIVITY

Zhiyi Chen, Michael Scullin
Baylor University

Introduction: Sleep restriction is known to alter sleep stages, but less is known about its effects on sleep microarchitecture. This is an important gap in knowledge because microevents, including sleep spindles and slow waves, are critical to sleep homeostasis, memory consolidation, and cognitive functioning. We experimentally investigated potential changes in sleep microevents during nights of normal sleep versus sleep restriction.

Methods: We monitored 75 healthy adults (mean age = 19.95; 55% female) using laboratory polysomnography across 7 nights. Following an adaptation night, participants alternated between three consecutive nights of normal sleep (9 hours time-in-bed) and three nights of restricted sleep (5.5 hours time-in-bed). Condition order was counterbalanced. Sleep stages were scored manually by a registered polysomnographic technician. YASA was employed to detect sleep microevents, including count, density, duration, amplitude, and frequency of N2 spindles, as well as count and density of N3 slow waves. Analyses were based on the C4-A1 channel.

Results: Experimental sleep restriction suppressed spindle count ($Z = -12.02$, $p < .001$), density ($Z = -7$, $p < .001$), and frequency ($Z = -7.12$, $p < .001$) whereas amplitude showed an increase ($Z = -4.34$, $p < .001$). Slow-wave count and density were unaffected (all $p > .05$). We next investigated whether these effects were static or dynamic across days. Across the normal sleep nights, there were no significant variations for spindles or slow waves. By contrast, across the sleep restriction nights, there was a decrease in spindle count ($\chi^2 = 17.6$, $p < .001$) and density ($\chi^2 = 7.52$, $p < .001$), whereas slow wave count showed a compensatory increase ($\chi^2 = 7.3$, $p < .001$).

Conclusion: Sleep restriction significantly suppressed spindles, with the decline intensifying over consecutive nights, which has implications for cognitive functioning. There was a simultaneous increase in spindle amplitude and slow wave count, which may represent compensatory responses, reflecting a homeostatic drive to prioritize deep sleep during reduced sleep opportunities.

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0206

SLEEP DURATION DEPENDS ON THE TIMING OF SLEEP ONSET, NOT THE DURATION OF WAKEFULNESS: AN ANALYSIS OF ~450,000 SLEEP-WAKE EPISODES

Angus Burns¹, Daniel Windred², Richa Saxena³, Charles Czeisler⁴, Sean Cain², Andrew Phillips⁵

¹Harvard Medical School, ²Flinders Health and Medical Research Institute (Sleep Health), Flinders University, ³Massachusetts

General Hospital, ⁴Brigham and Women's Hospital, ⁵Flinders University

Introduction: Sleep duration is jointly regulated by the circadian pacemaker and a homeostatic process. Yet, classical temporal isolation experiments have repeatedly made a counterintuitive observation: longer episodes of wakefulness (α) tend to be followed by shorter episodes of sleep (ρ). This leads to a negative $\alpha:\rho$ correlation. Most strikingly, when circadian phase is accounted for the residual $\alpha:\rho$ correlation has been observed to be ~ 0 . This observation contradicts traditional restorative hypotheses of sleep; however, no study has tested if this phenomenon generalizes to free-living humans.

Methods: To examine this, we analyzed ~450,000 sleep-wake episodes from 85,955 free-living older adults (62.3 ± 7.9 years, 58% female), using wearable-recorded light exposure and sleep data. Individual circadian phase (timing of core-body temperature minimum, CBTmin) was estimated using a validated model of the response of the central circadian pacemaker to light.

Results: We observed that longer prior wake duration was negatively associated with subsequent sleep duration ($\alpha:\rho \beta = -0.42$, $p < 0.0001$). Sleep duration exhibited marked variation with the predicted circadian phase of sleep onset: sleep durations were shortest (~ 3 h) when initiated just after CBTmin, while sleep durations were longest (~ 11 h) when initiated approximately 10 hours prior to CBTmin. A two-harmonic regression model revealed a peak-to-trough amplitude of 7.88 hours with an acrophase at -10.45 hours from CBTmin ($p < 0.0001$). These relationships were independent of age, sex and employment. Notably, after accounting for the predicted circadian phase of sleep onset, the association between prior wake duration and sleep duration was substantially attenuated and only showed a very weak positive association ($\alpha:\rho \beta = 0.005$, $p < 0.001$).

Conclusion: Here, we translate a counterintuitive finding from humans living under temporal isolation to the real world. As in free-run studies, greater duration of prior wakefulness is correlated with shorter sleep duration and this correlation is explained by the circadian timing of sleep onset. Most strikingly, we observed that when accounting for the circadian phase of sleep onset, there is virtually zero association between the duration of prior wakefulness and sleep duration.

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0207

LOW-DOSE ACETYLSALICYLIC ACID AFFECTS PRO-INFLAMMATORY AND PRO-RESOLVING LIPID MEDIATOR RESPONSES TO EXPERIMENTAL SLEEP RESTRICTION IN HEALTHY HUMANS

Larissa Engert¹, Rammy Dang², Ava Tang², Olivia Buraks², Annika Eske², Taylor Reed², Michael Vazquez², Bryan Chatterton², Suzanne Bertisch³, Charles Serhan³, Janet Mullington², Monika Haack²

¹Beth Israel Deaconess Medical Center, Harvard Medical School,

²Beth Israel Deaconess Medical Center, ³Brigham and Women's Hospital

Introduction: Sleep deficiency increases the risk for diseases involving immunopathology, in which inflammation is thought to be an underlying mechanism. A potential way to mitigate health consequences of deficient sleep is to target inflammation. Using low-dose acetylsalicylic acid (ASA, aspirin) as a probe, we have

previously shown that low-dose ASA blunts the pro-inflammatory immune response to experimental sleep restriction. The aim of the present study was to investigate whether low-dose ASA affects lipid mediator responses to sleep restriction in healthy humans.

Methods: We studied 46 healthy adults (19F/27M, 19-63 years) in a randomized crossover trial with 3 protocols each consisting of a 14-day at-home phase followed by an 11-day/10-night in-laboratory stay (sleep restriction/ASA, sleep restriction/placebo, control sleep/placebo) with daily ASA/placebo intake. During in-laboratory stays, sleep opportunity under both sleep restriction conditions was 8h during 2 baseline nights, 4h during 5 nights of restricted sleep, and 8h during 3 nights of recovery sleep. Under the control sleep condition, participants had a sleep opportunity of 8h/night throughout the protocol. Blood samples were analyzed at baseline, after 5 nights of sleep restriction/control sleep, and after 2 nights of recovery sleep/control sleep. Plasma lipids were measured via LC-MS/MS. Data were analyzed using GLMMs.

Results: Low-dose ASA blunted the pro-inflammatory lipid mediator response to experimental sleep restriction, as manifested in reduced PGE2 and TXB2 levels after sleep restriction and recovery sleep in the sleep restriction/ASA condition compared to sleep restriction/placebo ($p < .001$). Moreover, low-dose ASA showed complex effects on pro-resolving lipid mediator responses to sleep restriction, including changes in resolvins and maresins ($p < .05$).

Conclusion: These findings suggest low-dose ASA may counteract against inflammatory consequences of acute sleep restriction by modulating lipid mediator pathways. This study might pave the way to explore novel pharmacological mechanisms to target specific lipid mediator pathways in order to mitigate immunopathological consequences of sleep deficiency.

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0208

NO IMPROVEMENT IN DEGRADED PERFORMANCE ONE MONTH AFTER 7 NIGHTS OF MODEST SLEEP RESTRICTION

Samantha Riedy¹, Obada Alzghool², Thomas Balkin¹, Shiyu Tang², Paolo Zanutti-Fregonara², John Hughes¹, Rasha Hammamieh³, Aarti Gautam³, Allison Hoke³, Ida Crespo-Rosales³, Peter Molfese², Carlo Pierpaoli², Mustafa Irfanoglu², Peter Bandettini², Vinai Roopchansingh², Kajsa Carlsson¹, Vincent Capaldi⁴, Jan Willem van der Veen², Robert Innis²

¹Sleep Research Center, Center for Military Psychiatry and Neuroscience, Walter Reed Army Institute of Research, ²National Institutes of Health, ³Walter Reed Army Institute of Research, ⁴Uniformed Services University of the Health Sciences

Introduction: Sleep restriction (SR), defined as regularly obtaining less than seven hours of sleep per day, is associated with significant performance deficits in humans. Preclinical studies suggest that SR induces widespread microglial activation and neuroinflammation, damage to arousal nuclei, white matter damage, and other neuropathophysiological changes. Here we examine whether similar neuropathophysiological effects occur

in humans and whether such changes help explain SR-related performance deficits.

Methods: Seven healthy adults (ages 18-39) participated in a two-month study involving baseline, seven nights of SR (5h time-in-bed/night), and a one-month recovery period. Performance was assessed throughout the study. Magnetic Resonance Imaging (MRI) was conducted at baseline (T1), during middle and end of SR (T2-T3), following four nights of recovery sleep (T4), and after one month of recovery at home (T5). J-edited Magnetic Resonance Spectroscopy (MRS) indexed ten metabolites in a prefrontal cortex voxel serving as measures of neuroinflammation, glial activation, oxidative stress, and neuronal and axonal integrity. Positron Emission Tomography (PET) dynamic acquisitions with CT for attenuation correction were conducted at T1, T3, and T5. PET scans indexed translocator protein (TSPO), synaptic vesicular protein 2A (SV2A), and beta-amyloid as measures of microglial activation, synaptic density, and toxic protein aggregation, respectively. PET images were co-registered with MRI structural images. The study was approved by the Walter Reed Army Institute of Research Institutional Review Board.

Results: Psychomotor Vigilance Test (PVT) performance and self-reported vigor declined across SR and did not return to baseline levels one-month later ($F \geq 3.40$, $p \leq 0.03$). No significant changes were detected in MRS metabolites, TSPO and beta-amyloid measures, or self-reported sleepiness and mood.

Conclusion: One week of modest SR was associated with performance degradations that remarkably failed to improve at all from maximum impairment even one month later. Brain health indices did not explain the long-lasting deficits in performance. Preliminary results suggest: (a) SR is associated with behavioral effects that manifest before neurophysiological effects (in which case overt sleepiness may constitute an "early warning system"), and/or (b) the observed performance deficits are not driven by the brain health-related factors examined in this study. Data analyses are ongoing (e.g., SV2A, cortical thickness, etc.).

Support (if any): MOMRP

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0209

EXAMINING THE ROLE OF MENSTRUAL PHASE ON SUSTAINED ATTENTION THROUGHOUT TOTAL SLEEP DEPRIVATION

Megan Tran¹, Indy Silcox², Devon Hansen³

¹Elson S. Floyd College of Medicine Washington State University,

²University of Surrey, ³Washington State University

Introduction: Menstruation has been argued to affect the cognitive performance of women, but the available research is limited and its findings remain mixed. In this study, we investigated the effect of menstrual phase on one aspect of cognitive performance (i.e., sustained attention) throughout a period of total sleep deprivation (TSD).

Methods: A total of 31 healthy women (10 controls, mean age 27.6y $\pm$ 6.6y; 21 TSD, mean age 28.2y $\pm$ 5.9y) completed one of two highly controlled in-laboratory sleep studies each with a 38h TSD period or matching control condition with a 10h sleep opportunity. Performance was measured using a 10min version of the Psychomotor Vigilance Task (PVT). Test bouts administered at identical times in each study were used for analysis. Onset of menses and menstrual duration was determined using self-reported cycle length and regularity, most recent period, and

next predicted period. The follicular phase was defined as the beginning of menstruation to the start of ovulation. Ovulation was defined as 14 days prior to the predicted date of the next period. The luteal phase was defined as the start of ovulation to the onset of menstruation. In our sample, 11 women were in the follicular phase, 9 were in the luteal phase, and 11 were menstruating. No women were in the ovulation phase during experimentation.

Results: There was a significant increase in both the number of lapses of attention ($RT > 500\text{ms}$) and mean reaction time in the TSD group (all $F > 4.50$, $P < 0.01$). Performance on the PVT was not significantly affected by menstrual phase (all $F < 1.3$, $P > 0.30$).

Conclusion: As expected, TSD degraded performance on the PVT as evidenced by an increase in the number of lapses and mean RT. Although we did not have any women in the ovulation phase during experimentation, it does not appear that menstrual phase impacted performance on a sustained attention task beyond the effects of TSD itself. Future research will examine the impact of menstrual phase on subjective ratings of sleepiness and cognitive tasks measuring other facets of cognition administered throughout TSD.

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0210

FEASIBILITY OF A WEB-BASED SLEEP HEALTH INTERVENTION FOR MOTHERS OF CHILDREN WITH NEURODEVELOPMENTAL DISORDERS

Jiwon Lee¹, Yu Wang¹, A.J. Schwichtenberg², Regena Spratling¹

¹Georgia State University, ²Purdue University

Introduction: Although sleep is essential for health and daily functioning, 49–87% of mothers raising children with neurodevelopmental disorders (NDDs) report sleep disturbances. We developed MORESLEEP, a theory-based, caregiver-centered web-based intervention designed to enhance sleep health knowledge and sleep-related problem-solving for mothers and their children with NDDs. The primary study aim was to evaluate feasibility (with a secondary aim to explore preliminary efficacy).

Methods: We conducted a quasi-experimental, single-group study with self-identified mothers of school-aged children (3–12 years) with NDDs who reported poor maternal sleep quality (Pittsburgh Sleep Quality Index > 5). Participants completed four web-based modules over three weeks covering sleep health, stress reduction, sleep hygiene, and strategies to manage sleep disturbances in mothers and children. Mothers wore actigraphy for seven consecutive days and completed questionnaires assessing maternal sleep disturbance, daytime sleepiness, caregiving stress, parent-child interaction, depressive symptoms, overall health, and child sleep and behavior problems at baseline and post-intervention. Feasibility indicators included recruitment, retention, and satisfaction. Primary outcomes were actigraphy-based total sleep time (TST) and maternal sleep disturbance. Pre-post differences were examined using two-tailed paired t-tests.

Results: Thirty-seven mothers were screened; 24 did not meet eligibility criteria. Thirteen eligible mothers were invited, and 12 enrolled (recruitment rate = 92.3%) and completed the intervention (retention = 100%). Mothers rated MORESLEEP as effective, usable, and satisfactory. Mothers (median age 41 years

[Interquartile Range (IQR) 35.5–42.5]) were primarily Black (67%) and employed full- or part-time (92%). Children (median age 9 years [IQR 7–10.5]) were mostly boys (58%) and diagnosed with autism (75%). TST increased by 28 minutes on average ($p = 0.0017$), and maternal sleep disturbance decreased (mean difference [MD] = -8.1 , $p = 0.0057$). Depressive symptoms also decreased (MD = -4.5 , $p = 0.0136$). No significant changes were observed in the other outcomes.

Conclusion: MORESLEEP was feasible, acceptable, and showed preliminary efficacy for improving TST and reducing sleep disturbances among mothers of children with NDDs. A web-based sleep health intervention may be a promising approach to support sleep health in family caregivers. Larger randomized controlled trials are needed to confirm these findings.

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0211

BASELINE WHITE MATTER MICROSTRUCTURE PREDICTS VULNERABILITY TO INHIBITORY CONTROL DECLINE AFTER SLEEP DEPRIVATION

Kai Glahn, William Killgore, Jung won Cha
University of Arizona

Introduction: Sleep deprivation (SD) impairs attention and executive functioning, yet individuals vary in magnitude of cognitive decline. White matter (WM) microstructure may contribute to this, but reliable biomarkers of SD vulnerability have not been established. We examined whether baseline diffusion tensor imaging (DTI) measures predict SD-related changes in inhibitory control on a Go/No-Go (GNG) task, after 28 hours of wakefulness.

Methods: Thirty healthy adults (ages 20–43) underwent diffusion MRI (dMRI) during rested wakefulness, then remained awake for 28 hours. Inhibitory control was assessed before and during SD, using the GNG task at five different timepoints: two baseline sessions before SD (Tests 1–2) and three sessions during SD (Tests 3–5). dMRI data were acquired on a 3T Siemens system and processed with QSIPrep. Deterministic tractography in QSIRecon was used to reconstruct 56 atlas-defined WM pathways, from which fractional anisotropy (FA), mean diffusivity (MD), radial diffusivity (RD), and axial diffusivity (AD) were extracted. Based on exploratory findings and prior literature implicating arousal and inhibitory-control circuits, confirmatory analyses focused on two pathways: the medial forebrain bundle (MFB), a key monoaminergic arousal pathway, and the subthalamic fasciculus, which supports the hyperdirect inhibitory-control pathway. Three GNG d' percentage-change indices were highly correlated ($r > .90$); therefore, a single primary outcome measure (GNG_dprime_PCTbase_345_2) was selected to reduce redundancy. False discovery rate (FDR) correction was applied across eight tract-metric comparisons.

Results: Higher baseline MD, RD, and AD in the right MFB were significantly associated with greater SD decline in inhibitory control (all $p < .006$, FDR-corrected $p < .05$). Similarly, higher MD, RD, and AD in the left subthalamic fasciculus predicted larger SD-related performance impairments (all $p < .006$, FDR-corrected $p < .05$). FA was not significantly associated with outcomes in either tract. These results indicate that reduced microstructural integrity in

both arousal-regulatory and rapid inhibitory-control pathways confers greater vulnerability to SD.

Conclusion: Baseline WM microstructure in the MFB and subthalamic fasciculus was strongly associated with individual differences in inhibitory-control decline following SD. Greater baseline diffusivity, reflecting reduced microstructural integrity, predicted poorer performance after SD. These findings suggest structural differences in monoaminergic arousal circuits and cortico-subthalamic inhibitory pathways may contribute to cognitive vulnerability.

Support (if any):

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0212

IMPACT OF AT-HOME SLEEP EXTENSION INTERVENTION ON FUNCTIONAL CAPACITY IN PATIENTS WITH HEART FAILURE: RESULTS FROM SLEEP-HF PILOT FEASIBILITY STUDY

Syed Imran Ahmed¹, Ryan Garten², Danielle Kirkman², Alexander Lucas³, Leila Humphreys⁴, Salvatore Carbone⁵

¹University of Idaho, ²Virginia Commonwealth University,

³School of Public Health Pauley Heart Center, Division of

Cardiology Virginia Commonwealth University, ⁴Virginia Commonwealth University, Kinesiology and Health Sciences,

⁵Macon & Joan Brock Virginia Health Sciences, Old Dominion University

Introduction: Heart failure with preserved ejection fraction (HFpEF) covers more than half of all heart failure cases in the US. Poor sleep quality has been identified as a significant risk factor for HFpEF. Behavioral sleep extension interventions have shown positive health outcomes. However, it is yet to be tested in patients with HFpEF who often suffer from poor sleep quality. We hypothesize that a personalized sleep extension intervention is feasible in patients with HFpEF who habitually experience poor sleep quality and would improve functional capacity

Methods: Participants completed a 2-week single-arm open-label feasibility study with a 1-week run-in phase. After the run-in phase, participants who qualified received a 40-minute sleep coaching session, which combines sleep education, cognitive behavioral techniques, lifestyle coaching in addition to sleep hygiene training. Participants received an over-the-phone re-coaching session after one week and returned for the final visit after two weeks. The outcomes were assessed using actigraphy-based sleep assessment, the 6-minute walk test for functional capacity, and anthropometry. The feasibility outcomes were reported descriptively. We used a t-test to compare the differences between baseline and the end of the study

Results: 10 participants (80% female, 60% Black African American, mean age 71.5±9.5 years, BMI 36.5±11.6 kgm⁻², 6MWD 244.3±87.7 meters) were enrolled and 9 of them completed the intervention. Total bedtime (+0.26 hours, $p=0.021$), sleep time (+0.6 hours, $p=0.001$), sleep efficiency (+5.7%, $p=0.004$) significantly increased, where wake up after sleep onset (-17.7 minutes, $p=0.002$), movement index (-5.3%, $p=0.006$), and sleep fragmentation index (-8.1, $p=0.009$) were reduced significantly (Figure 1A). 6-minute walk distance was significantly increased 20.14±17.7 ($p=0.009$) compared to baseline. Sleep extension was associated with an increase of 20.14±17.7 ($p=0.009$) meters 6-minute walk distance

(6MWD) (Figure 1B). However, sleep efficiency ($r=0.78$, 95%CI: 0.2, 0.9; $p=0.014$) and WASO ($r=-0.67$, 95%CI: 0.9, 0.01; $p=0.049$) was associated with 6MWD but not with other sleep parameters.

Conclusion: Our results suggest that the sleep extension intervention is feasible and can be a viable tool to improve functional capacity in patients with HFpEF. These compelling results underscore the urgent need for further research with a larger, properly randomized sample to confirm these promising findings.

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0213

NETWORK-LEVEL BRAIN CONNECTIVITY PREDICTS RESILIENCE TO SLEEP DEPRIVATION

Jung won Cha¹, David Negelspach¹, Alisa Huskey¹, Kathryn Kennedy¹, Jason Katz¹, Kymberly Henderson-Arredondo¹, Catherine Seader¹, Allie Jepson¹, Salma Patel¹, Daniel Forger², William Killgore¹

¹University of Arizona, ²University of Michigan

Introduction: Sleep deprivation (SD) reliably impairs vigilance, but people differ considerably in how quickly and severely their performance declines. Understanding the neural patterns that accompany this variability may help identify mechanisms of resilience to SD. Here we examined whether the Resilience to Sleep Deprivation Metric (RSDM), a behavioral summary of preserved reaction speed relative to baseline, was reflected in the way functional brain networks reorganize during prolonged wakefulness.

Methods: Sixteen healthy adults (8 females, age = 23.6 ± 4.6) completed a 39-hour SD protocol with six resting-state fMRI scans collected every six hours. Psychomotor vigilance task (PVT) performance was assessed at each scan, and RSDM was computed as the ratio of reaction speed during later (Sessions 4-6) versus earlier (Sessions 1-3) phases. Functional connectivity was estimated across 375 regions (Glasser cortical + Harvard-Oxford subcortical). Network-Based Statistics (NBS) tested RSDM × Hours Awake interactions on edge-level connectivity (FWE-corrected $p < .05$), controlling for baseline lapses, circadian phase, and random effects. Nodal strength was evaluated for regions identified in NBS, with FDR correction applied across these nodes.

Results: Two subnetworks showed significant resilience-dependent modulation (FWE-corrected $p < .05$). One involved bilateral thalamus, globus pallidus, and posterior cingulate – regions linked to arousal and thalamocortical relay. The other included ventral and dorsal visual cortices, auditory areas, and medial temporal regions involved in perception and memory. In both networks, individuals with higher RSDM values (i.e., resilient) maintained or increased connectivity as waking time accumulated, whereas those with lower RSDM (i.e., Vulnerable) showed progressive reductions. Nodal strength analyses followed the same pattern, highlighting resilience-related differences in thalamus, basal ganglia, and ventral visual cortex (FDR-corrected $p < .05$).

Conclusion: Resilient individuals appear to preserve integration within thalamocortical and perceptual-memory networks during extended wakefulness. These network features may help clarify why some individuals are able to sustain performance during sleep loss and could inform future efforts to develop imaging-based markers or strategies to mitigate fatigue-related decline.

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0214

EXPLORING THE RELATION BETWEEN TIME IN BED AND SLEEPINESS IN TYPICALLY DEVELOPING YOUTH

Hinal Patel¹, Chelsea Cadle¹, Gabrielle Deutsch¹, Emmet Klein¹, Maninder Kalra², Paola Malerba¹

¹Center for Biobehavioral Health, Nationwide Children's Hospital, ²Nationwide Children's Hospital

Introduction: Insufficient sleep is the most common reason for excessive daytime sleepiness in youth. To explore factors underlying this issue, we examined the relationship between time in bed (TIB) and sleepiness, along with the potential role of behaviors that may compensate for insufficient TIB, using self-reported sleep diaries and questionnaires in typically developing (TD) youth.

Methods: We recruited TD youth aged 8–19 with Pediatric Sleep Questionnaire scores ≤ 33 to ensure healthy sleep status. Participants completed the Epworth Sleepiness Scale for Children and Adolescents (ESS-CHAD) and a 7-day sleep diary from which we compute average TIB, caffeine use, exercise, napping, and electronics use. Fifty-eight participants aged 8–18 completed all measures (mean age = 12.7 ± 3.1 years, 35 females). Sufficient TIB was defined as recommended age-based sleep duration per American Academy of Sleep Medicine guidelines plus one hour (≥ 600 minutes for ages 6–12; ≥ 540 minutes for ages 13–18). ESS-CHAD scores ≥ 10 indicated abnormal sleepiness. We examine correlations between sleepiness and TIB using Pearson's correlations, controlling for age and BMI with partial correlations. We further explore compensatory behaviors by independent sample t-tests. Significance was $p < .05$.

Results: TIB and ESS-CHAD scores were negatively correlated ($r = -.29$, $p = .04$), although when accounting for age and BMI, this correlation was no longer significant ($r = -.20$, $p = .17$). 24.1% of participants ($n = 14$) showed abnormal sleepiness. Among those with normal sleepiness ($n = 44$), two subgroups were identified: sufficient TIB ($n = 24$) and insufficient TIB ($n = 20$). Independent t-tests showed no age or BMI differences between subgroups. The insufficient TIB group showed significantly higher caffeine intake than the sufficient TIB group ($p = .03$), while exercise ($p = .90$) and electronics use ($p = .16$) did not differ. Napping trended toward significance ($p = .07$).

Conclusion: TD youth showed high prevalence of abnormal sleepiness (24.1%). Insufficient sleepers with normal sleepiness napped more frequently and had higher caffeine intake than sufficient sleepers. These findings highlight that excessive daytime sleepiness is common in TD youth, and insufficient sleepers may rely on compensatory strategies like naps and caffeine to contribute to total daily rest and reduce sleepiness.

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0215

THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES IN THE RELATIONSHIP BETWEEN EXPERIMENTAL SLEEP DISRUPTION AND PAIN IN HEALTHY YOUNG ADULTS

Jeongwi An¹, Matthew Reid¹, Darlynn Rojo-Wissar², Julia Weinman¹, Fatima Ahmed¹, Bryan Herrera¹, Anna Kim-Dahl¹, Michelle Mei¹, Patrick Finan³, Michael Smith¹

¹Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, ²Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, ³Department of Anesthesiology, University of Virginia

Introduction: Adverse Childhood Experiences (ACEs) increase risk for insomnia and chronic pain, but it remains unknown whether ACEs influence the relationship between sleep and pain. We examined whether experimental sleep disturbances alter suprathreshold heat pain as a function of ACEs.

Methods: Following baseline, 68 healthy, pain-free, good sleepers (M Age = 30.5; 66.2% female) were randomly assigned in a parallel arm experiment to: Sleep Continuity Disruption [SCD ($n = 24$)]; Sleep Fragmentation [SF ($n = 22$)] or Undisturbed Sleep [US ($n = 22$)] for two nights. SCD involved 8-hourly forced awakenings (7, 20-mins. and 1, 60-min). SF involved auditory and vibrotactile stimulation to induce microarousals (~ 42 /hr.) The morning following the second sleep condition, participants completed PET neuroimaging, during which we administered suprathreshold heat pain to the ventral forearm for 45-minutes. Pain intensity was rated each minute. Thermode temperature was preset, individually tailored at baseline to yield moderate pain (40/100).

Results: None of the conditions differed on baseline sleep continuity and architecture ($p > .05$). SCD demonstrated significantly reduced TST ($\sim 45\%$), N3 and REM mins compared to US ($p < .001$). SF demonstrated a two-fold increase in the arousal index and N1 mins compared to US and SCD ($p < .001$), but TST and continuity were preserved. At baseline, all conditions achieved comparable pain40 ratings with no differences by ACEs ($p = .69$). The prevalence of reporting at least one ACE did not differ across conditions (SCD = 60.0%, SF = 50.0%, US = 55.6%; $p = .83$). Among participants without ACEs, multilevel models controlling for pain40 temperature, yielded a significant group X time interaction, such that pain intensity increased in SCD compared to US ($p < .05$). Participants with ACEs, however exhibited an opposite pattern. SCD reported lower pain intensity ($p = .06$) and no sleep condition X time interaction ($p = .22$). There were no alterations in pain in SF compared to controls, regardless of ACEs ($p > .52$).

Conclusion: ACEs may influence the effects of sleep disruption on suprathreshold pain. The presence of at least one ACE conferred resilience to the hyperalgesic effects of SCD on pain sensitivity.

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0216

VAPING AND SLEEP DURATION: A CROSS-SECTIONAL ANALYSIS OF THE U.S. HIGH SCHOOL STUDENTS

RuiNing Hang

Johns Hopkins University

Introduction: Insufficient sleep is becoming increasingly common among U.S. adolescents. Sleep deprivation can often lead to negative outcomes such as cognitive impairment, unstable mood, and poor school performance. The use of e-cigarettes, or vaping, has become more and more popular among youth in recent years. While some research on the impact of tobacco on sleep has been conducted in the past, the association of e-cigarette use with sleep among high school students has not yet been investigated. This study aims to investigate the correlation between vaping and getting fewer than eight hours of sleep among U.S. high school students.

Methods: A secondary analysis was conducted utilizing the 2021 Youth Risk Behavior Surveillance System (YRBSS). In the survey, students were asked to state their current e-cigarette usage and sleep behaviors, defined as having less than eight hours of sleep a night. A cross-tabulation and Wald chi-square test of association were conducted to determine whether the correlation is significant.

Results: Among the sample of 12,711 students used for the analysis, 82.5% of current e-cigarette users reported insufficient sleep, compared with 76.0% of non-users. Only 17.5% of e-cigarette users obtained eight or more hours of sleep, compared with 24.0% of non-users. The association between current vaping and insufficient sleep was found to be statistically significant.

Conclusion: The results show that vaping may contribute to insufficient sleep among high school students in the U.S. This highlights that current efforts to address and improve adolescent sleep should take the potential impact of vaping into consideration. It may be helpful to add sleep-focused messages to youth vaping prevention programs in the future.

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0217

AUTONOMIC CORRELATES OF BRAIN-STATE MORPHOMETRY IN SLEEP DEPRIVATIONJung won Cha¹, Alisa Huskey¹, David Negelspach¹, Kathryn Kennedy¹, Jason Katz¹, Catherine Seader¹, Allie Jepson¹, Salma Patel¹, Daniel Forger², William Killgore¹¹University of Arizona, ²University of Michigan

Introduction: People differ widely in their tolerance to extended wakefulness, yet the physiological factors underlying this variability remain unclear. T1-weighted morphometry can vary over short timescales due to transient physiological states rather than structural change. Autonomic activity, particularly parasympathetic vagal modulation indexed by heart-rate variability (HRV), may contribute to these fluctuations. Root Mean Squared Successive Differences (RMSSD) and High-Frequency normalized units (HFnu) capture time- and frequency-domain parasympathetic activity.

Methods: Sixteen healthy adults (8 females; age = 23.6 ± 4.6) completed 39 hours of sustained wakefulness with six MRI sessions. HRV was derived from pulse plethysmography and used to compute RMSSD (short-term vagal index) and HFnu (respiration-linked vagal modulation). FreeSurfer provided morphometry measures; resting-state connectivity was used to compute graph-theoretic nodal strength. Linear mixed-effects models tested HRV $\times$ Hours Awake interactions for each measure, adjusting for circadian phase (sin/cos terms) and including random subject intercepts. Analyses focused on a priori hubs with restricted FDR correction. Morphometry calculations controlled for estimated intracranial volume (eTIV).

Results: RMSSD significantly moderated changes in left thalamic morphometry (FDR-corrected $p < 0.05$): higher-RMSSD individuals showed steeper decline in thalamic volume across wakefulness, whereas lower-RMSSD individuals showed flatter slopes. Thalamic nodal strength showed a similar RMSSD $\times$ Hours Awake interaction (FDR-corrected $p < 0.05$). HFnu significantly moderated surface area in salience-frontal regions, including the frontal middle sulcus, anterior cingulate cortex (ACC), and inferior circular insula (all FDR-corrected $p < 0.05$), with higher HFnu predicting relative preservation and lower HFnu showing decline. These changes were small in magnitude and are best interpreted as short-term physiological fluctuations rather than true structural alterations.

Conclusion: State-dependent changes in morphometry closely tracked autonomic state. RMSSD was most strongly aligned with thalamic decline over time, whereas HFnu was linked to relative stability in salience-frontal regions, suggesting that HRV indices capture transient physiological influences on morphometry during sleep deprivation. Future work may evaluate whether these fluctuations contribute to cognitive effects of sleep deprivation.

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0218

CAN PHYSICAL ACTIVITY MITIGATE THE ADVERSE CARDIOMETABOLIC HEALTH CONSEQUENCES OF HABITUAL SHORT SLEEP DURATION?Grace Zimmerman¹, Michelle Kubicki¹, Audrey Stegman¹, Alisha Chong¹, Kelly Baron¹, Kenneth Wright², Chris Depner¹, Krishna Sundar³¹University of Utah, ²University of Colorado, ³UC Davis Medical Center

Introduction: Insufficient sleep increases obesity and diabetes risk, yet effective interventions to reduce this risk remain limited. Results from short-term experimental sleep restriction suggest physical activity may mitigate these adverse effects of sleep loss. However, it remains unclear if physical activity similarly mitigates risk among individuals with habitual insufficient sleep. Thus, we examined whether moderate-to-vigorous physical activity (MVPA) is associated with insulin sensitivity status in adults with insufficient sleep, and whether MVPA provides explanatory value beyond body mass index (BMI). This preliminary cross-sectional analysis leveraged data from two ongoing studies in adults with insufficient sleep and normal BMI (study A) or overweight/obese BMI (study B).

Methods: Participants in both studies reported habitual sleep < 6.5 h/night; study A ($n=24$, age 23.4 ± 4.4 y, BMI = 22.1 ± 2.1 kg/m²);

study B ($n=10$, age 34.0 ± 7.0 y, BMI $= 29.3 \pm 3.1$ kg/m²). Across two weeks, MVPA was measured using ActivPAL™ devices and total sleep time (TST) was assessed by wrist-actigraphy. Insulin sensitivity was evaluated using Matsuda Index from oral glucose tolerance testing in study A, and glucose infusion rate/kg of body weight (GIR) from hyperinsulinemic-euglycemic clamps in study B. Using established thresholds, participants in both studies were classified as either insulin “sensitive” or “resistant”.

Results: Insulin sensitivity status differed with 76.9% in study A classified as “sensitive” versus 33.3% in study B ($\chi^2(1)=5.64$, $p=0.018$). MVPA was higher ($p=0.03$) in A (38.2 ± 21.1 min/day) versus B (23.1 ± 14.6 min/day). Using logistic regression, BMI, but not MVPA, significantly predicted insulin sensitivity status (BMI: OR=1.45, 95% CI:1.11–2.19 $p=0.024$). Furthermore, after adding MVPA, BMI remained significant (OR=1.32, 95% CI:1.05–1.85, $p=0.049$), and model fit was not significantly altered ($p=0.77$, Likelihood Ratio Test), indicating MVPA did not significantly attenuate the BMI-insulin sensitivity status association.

Conclusion: Among adults with habitual insufficient sleep, BMI was the strongest determinant of insulin sensitivity status, whereas MVPA did not independently predict insulin sensitivity status. Differences between study groups highlight variability in metabolic risk, suggesting individuals with insufficient sleep and higher BMI may face greater cardiometabolic vulnerability that MVPA alone may not counteract. Future research using randomized controlled trials is needed to confirm these observational analyses.

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0219

DISTINGUISHING NOCTURNAL AND GENERAL LONELINESS: IMPLICATIONS FOR MARITAL QUALITY

Kate Hunter, Sophie Haun, Abigail Boyles, Yen Tung Su, Jamon Jex, Dustin Sherriff-Clayton, Chongming Yang, Kara M. Duraccio, Daniel Kay
Brigham Young University

Introduction: General loneliness refers to the unpleasant experience that arises when one's social network feels insufficient. Individuals in lower-quality marriages marked by conflict, withdrawal, or poor communication experience higher loneliness. Nocturnal Loneliness involves feeling lonely at night or during sleep difficulties. Whether nocturnal loneliness is distinctly related to marital quality compared to general loneliness has not yet been established. We hypothesized that nocturnal loneliness would be uniquely associated with lower marital quality relative to general loneliness.

Methods: Participants ($N = 442$) were recruited through Prolific, an online research platform (49% female; M age = 45.6; 38% married). They completed an online survey including demographic questions, the Norton Quality of Marriage Index (QMI), the UCLA Loneliness Scale (LS), and the Nocturnal Loneliness Scale (NLS). Confirmatory factor analysis (CFA) examined the measurement properties of the LS and NLS. Latent profile analysis was conducted using factor scores from the CFA and demographic variables (age, race, education, gender).

Results: A four-class model provided the best fit. CFA supported a two-factor structure for the NLS: loneliness at night (NLS1) and loneliness associated with sleep-disorder experiences (NLS2). A two-factor structure also emerged for the LS: intimate emotional loneliness (LS1) and social loneliness/isolation (LS2). Latent profile analysis further supported the four-class solution, indicated by the lowest BIC (1700), strong entropy (.85), and an adequately sized smallest class (16.8%). Class 1 showed low levels of NLS1 and LS1 (-0.67 and -0.97 , respectively). Class 2 showed moderately low NLS1 and QMI scores (-0.59 and -0.42 , respectively). Class 3 reflected moderate, mixed loneliness, with elevations on NLS2 and LS2 (0.25 and 0.23, respectively). Class 4 exhibited high scores across both NLS and LS dimensions (0.69 and 0.88, respectively).

Conclusion: Findings supported the hypothesis that nocturnal and general loneliness are distinct, multidimensional constructs, each uniquely associated with marital quality. The identification of four loneliness profiles underscores the importance of developing targeted interventions that address specific patterns of loneliness. Such tailored approaches have the potential to strengthen both marital relationships and sleep health among married couples.

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0220

DO JURORS DOUBT CONFESSIONS FROM SLEEP-DEPRIVED SUSPECTS?

Zlatan Krizan, Breanna Curran
Iowa State University

Introduction: False confessions are more likely to occur following lengthy interrogations and extreme fatigue induced by sleep deprivation. Are potential jurors more likely to doubt confessions when given by very fatigued and sleep-deprived individuals? Understanding such lay perceptions about confessions is critical for identifying gaps between scientific understanding of sleep loss and public understanding, but also for informing courts who must evaluate the reliability of statements obtained from sleep-deprived suspects.

Methods: A pre-registered study examined what impact interrogation length and timing had on potential juror's perceptions of suspects' resultant confessions. The study employed a 2 (interrogation length: 1 hr or 10 hrs) by 3 (interrogation timing: following sleep, following day work, or following night work) mixed design. Participants ($N = 266$) were jury-eligible young adults (56% women, 18-33) who evaluated two criminal cases during a mock trial. Cases involved a physical assault and a vehicular injury, alongside a witness and a suspect who later confessed following an interrogation. All subjects received state-required jury instructions and passed extensive checks. After each case, the participants indicated their verdict, followed by perceptions of suspect autonomy, coercion during the interrogation, vulnerability and sleep-related impairment.

Results: Participants acknowledged that suspects were much more fatigued following long interrogations and work. When judging guilt, participants were much less likely to convict suspects following a long than a short interrogation, while showing trends toward fewer convictions of sleep-deprived confessors. Mock jurors viewed suspects undergoing long interrogations as having less autonomy, more coercion, and higher cognitive impairment, ultimately doubting the suspects' confessions even when rested.

Furthermore, participants viewed Miranda waivers and confessions obtained from suspects after working long and overnight hours as less autonomous and more cognitively impaired. However, they did not mark confessions from such suspects as more coerced or less accurate.

Conclusion: While mock jurors recognized that interrogation timing and length that induce sleep-deprivation can jointly amplify fatigue and increase impairment, they were not more likely to doubt confessions obtained following overnight work, despite significant sleep loss. The findings reveal novel insights regarding real-life factors that undermine perceptions of confession evidence and highlight gaps in lay understanding of sleep-related impairment.

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0221

DYNAMIC AND STABLE ASSOCIATIONS BETWEEN MULTIDIMENSIONAL SLEEP AND CARDIOVASCULAR PHYSIOLOGY: EVIDENCE FROM A 27-MONTH LONGITUDINAL COHORT

Josh Leota¹, Sarah Pickus¹, Summer Jasinski¹, Ursula Beattie¹, David Presby¹, Greg Grosicki¹, Charli Sargent², Greg Roach², Emily Capodilupo¹, Victoria Lee¹

¹WHOOP, Inc., ²Central Queensland University

Introduction: Sleep duration, timing, and consistency each influence cardiovascular physiology, yet their independent and interactive contributions remain unclear. Prior research links short, mistimed, or irregular sleep to higher resting heart rate (RHR) and lower heart rate variability (HRV), but few studies have evaluated nightly deviations, stable between-person differences, and long-term changes simultaneously. This study examined how multidimensional sleep patterns relate to nocturnal cardiovascular function and multi-year physiological trajectories in free-living individuals.

Methods: Participants (N = 8,388) were monitored for 27 months (April 2023–June 2025) with a validated biometric device that provided objective sleep metrics, including duration, midsleep timing, and sleep consistency (day-to-day regularity of sleep-wake timing), alongside nightly RHR and HRV. Generalized additive mixed models assessed between-person (participant-level averages) and within-person (nightly deviations from 28-day rolling means) associations between sleep measures and nocturnal RHR and HRV, adjusting for age, gender, body mass index, average and daily physical activity, seasonality, weekday, and auto-correlated errors. Weekly aggregated models evaluated whether two-year changes in sleep dimensions predicted long-term cardiovascular trajectories.

Results: Between participants, greater sleep consistency correlated with lower RHR, even after controlling for sleep duration and timing ($p < .001$), whereas longer sleep duration correlated with higher HRV ($p < .001$). Within participants, sleeping shorter-than-usual or later-than-usual correlated with higher RHR and lower HRV, whereas sleeping longer-than-usual or earlier-than-usual showed the opposite (p s $< .001$). Nightly changes in sleep consistency did not predict changes in RHR or HRV. Two-year trajectory models demonstrated that favorable changes in sleep (i.e., greater consistency, longer duration, and earlier timing) aligned with

progressive improvements in cardiovascular physiology, reflected by decreasing RHR and increasing HRV across the same period. In contrast, participants whose sleep patterns worsened exhibited parallel physiological declines.

Conclusion: Sleep duration, timing, and consistency each demonstrate distinct relationships with nocturnal cardiovascular physiology. Sleep consistency emerges as the strongest predictor of between-person RHR and long-term cardiovascular trajectories, whereas nightly deviations in duration and timing were most strongly associated with short-term fluctuations in RHR and HRV. These results suggest effective sleep interventions may benefit from emphasizing long-term consistency while also managing nightly deviations in duration and timing to support cardiovascular health.

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0222

EFFECTS OF SIMULATED REGULAR AND IRREGULAR SLEEP-WAKE TIMING ON DARK-LIGHT SCHEDULES

Melissa St. Hilaire¹, Leilah Grant², Cassie Hilditch³, Andrew McHill⁴, Andrew Phillips⁵, Laura Barger⁶, Shadab Rahman², Charles Czeisler⁷, Elizabeth Klerman⁸

¹Merrimack College, ²Brigham and Women's Hospital and Harvard Medical School, ³Central Queensland University, ⁴Oregon Health & Science University, ⁵College of Medicine and Public Health, Flinders University, ⁶Division of Sleep Medicine, Harvard Medical School, ⁷Brigham and Women's Hospital, ⁸Massachusetts General Hospital

Introduction: Irregular sleep-wake patterns have been associated with later circadian phase, lower academic performance, and many adverse health outcomes. It remains unknown whether the irregular sleep-wake patterns themselves or their associated dark-light patterns drive these effects. We designed an inpatient protocol to assess the effect of regular and irregular sleep-wake/dark-light patterns on multiple outcomes.

Methods: Our 26-day inpatient study included: (i) one 24-hour baseline day (8-hour sleep:16-hour wake; sleep scheduled from 00:00-08:00); (ii) 21 days on a randomized Early Regular (ER), Late Regular (LR), or Irregular (IR) sleep-wake/dark-light schedule; (iii) a 30-hour interval of 90-minute "ultradian days"; and (iv) a final 24-hour recovery day (8-hour sleep:16-hour wake). Each randomized schedule (both sleep-wake and light levels) was generated from 7-day sleep-wake schedules collected during an observational study in college students. Light levels were changed at the beginning of each hour during scheduled wake to 4, 50, 90, 450, or 2,500 photopic lux, based on hourly light bins measured by wrist actigraphy, and set to 0 lux during scheduled sleep. Schedules were selected for regularity as defined by a Sleep Regularity Index above 80 (ER and LR schedules) or below 60 (IR schedule). Regular schedules were classified as Early or Late based on sleep midpoint timing. All schedules (3 ER, 4 LR, 4 IR) were selected to have similar sleep durations within a 7-day interval (average 6.5-9 hours per 24-hours). Each 7-day interval was repeated three times to create each final 21-day schedule.

Results: Morning light exposure (area under the curve [AUC] of photopic illuminance between 06:00-12:00) was significantly higher for ER compared to LR ($p=0.0002$) and IR ($p=0.002$) but not

different between LR and IR ($p=0.42$). Evening light exposure (AUC of photopic illuminance between 18:00-00:00) was significantly lower on ER compared to LR ($p=0.004$) but not different between ER and IR ($p=0.09$) or LR and IR ($p=0.18$).

Conclusion: The selected early-timed regular, late-timed regular, and irregular schedules had differences in morning and evening light exposure, independent of sleep duration or regularity. This protocol can be used to investigate the impact of these differences on multiple circadian and neurobehavioral outcomes.

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0223

HORMONAL CONTRACEPTIVE USE AND COGNITIVE FLEXIBILITY DURING A SLEEP-DEPRIVATION GO/NO-GO REVERSAL TASK

Brooklyn Nunes, Kathryn Kennedy, Michael Grandner, William Killgore
University of Arizona

Introduction: Cognitive flexibility permits an individual to adapt behavioral responses following a change in circumstance. Although hormonal contraceptives (HCs) have been shown to influence several cognitive processes, their impact on cognitive flexibility during sleep loss is largely unexplored. Sleep deprivation is known to impair executive functioning broadly, including processes involved in adaptive behavior and cognitive flexibility. Through the alteration of endogenous hormone levels, HCs may contribute to differences in cognitive flexibility, as compared to naturally cycling females. This study examined whether HCs were associated with differences in cognitive flexibility following rule reversal during sleep deprivation.

Methods: Forty-eight participants (ages 18-30) undergoing 28-hours of total sleep deprivation were organized into three groups: males ($n = 25$), naturally cycling (NC) females ($n = 12$), and HC females ($n = 10$). Participants completed cognitive assessments between 12pm and 2pm on Days 1 and 2, separated by a night of total sleep deprivation. D-prime scores were calculated for pre-reversal and post-reversal phases of a Go/No-Go task. The reversal phase required participants to inhibit a learned prepotent response and adjust to a new stimulus-response rule. General linear models were used to evaluate within-subject effects of Day (rested vs. sleep-deprived), between-subject effects of Group, and Day $\times$ Group interactions

Results: There were no significant effects of Day or Day $\times$ Group interactions in either task phase (all $p > .05$), indicating that sleep deprivation did not produce consequential changes in reversal performance. However, a significant between-group effect was identified for post-reversal ($F(2,44) = 5.81$, $p = .006$), with HC females displaying significantly lower sensitivity than males and NC females. No group differences were noted in the pre-reversal phase ($p = .376$).

Conclusion: Females using HCs demonstrated reduced cognitive flexibility when compared to naturally cycling females and males, as exemplified by lower post-reversal d' scores, independent of sleep deprivation effects. These findings suggest that altered hormonal status induced by contraceptives may negatively impact

adaptive decision-making, but this effect is not influenced by sleep deprivation. Further research is necessary to clarify the cognitive implications of hormonal contraceptives on executive functioning in larger samples and in real-world sleep-loss applications.

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0224

MULTIDIMENSIONAL SLEEP HEALTH DURING PREGNANCY AND THE POSTPARTUM PERIOD

Gyurin Kim¹, Jaemyung Kim¹, Christopher Kline², Bethany Barone Gibbs³, Kara Whitaker¹

¹University of Iowa, ²University of Pittsburgh, ³West Virginia University

Introduction: Perinatal sleep is critical to support maternal health, but evidence assessing multidimensional sleep changes from pregnancy through the first postpartum year remains limited. This study examined multidimensional sleep health patterns across the perinatal period using six domains: duration, efficiency, timing, regularity, satisfaction, and alertness.

Methods: A total of 50 participants in the Pregnancy 24/7 Cohort Study and the Postpartum 24/7 Pilot Study wore the Actiwatch Spectrum Plus and completed a sleep diary for 7 consecutive days during the 1st, 2nd, and 3rd trimesters of pregnancy and at 3, 6, and 12 months postpartum. Sleep duration was defined as the interval between sleep onset and sleep offset, and sleep efficiency as the percentage of time spent asleep while in bed. Sleep timing was calculated as the mean sleep midpoint, defined as the halfway point between sleep onset and sleep offset. Sleep regularity was defined as the standard deviation (SD) of the sleep midpoint. Satisfaction and alertness were obtained using single-item questions (subjective sleep quality, daytime dysfunction) from the Pittsburgh Sleep Quality Index. Linear mixed-effects models assessed continuous domains, and chi-square tests evaluated categorical domains, with Tukey-adjusted comparisons.

Results: Sleep duration, efficiency, and regularity significantly changed across the perinatal period. Duration in the 1st trimester (8.66 hours) was significantly longer than at 6 and 12 months postpartum (8.20-8.21 hours, all $p \leq .007$). Efficiency was lowest at 3 months postpartum (85.99%), compared to all pregnancy trimesters (88.00-88.64%, all $p \leq .002$), but improved progressively across the postpartum year, returning to pregnancy levels by 12 months (87.50%). Regularity at 12 months postpartum (SD=30 minutes) was more consistent than during all pregnancy trimesters (1st: 39 min, $p=.018$; 2nd: 43 min, $p=.012$; 3rd: 41 min, $p=.004$). Timing, satisfaction and alertness showed no significant changes across pregnancy and postpartum.

Conclusion: Although participants generally demonstrated healthy sleep patterns, notable changes in specific sleep domains were observed. Future studies should examine these patterns in more diverse or higher-risk populations to better understand how multidimensional sleep health changes across the perinatal period, followed by work to identify which domains are most relevant for maternal health outcomes.

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0225

RECONSIDERING THE HUMAN EMOTIONAL BRAIN WITHOUT SLEEP: IS IT A 'PREFRONTAL-AMYGDALA DISCONNECT' OR REORGANIZATION OF AMYGDALA-CENTRIC NETWORKS?William Killgore¹, Jason Katz¹, Kymberly Henderson-Arredondo¹, Catherine Seader¹, Allie Jepson¹, Kathryn Kennedy¹, Salma Patel¹, Alisa Huskey¹, Jung won Cha¹, Daniel Forger²¹University of Arizona, ²University of Michigan

Introduction: It is well known that sleep deprivation (SD) leads to hyper-responsiveness of the amygdala (a key node of the brain's emotional system). Prior neuroimaging work has suggested that the medial prefrontal cortex (MPFC) provides inhibitory top-down regulation of the amygdala when normally rested. However, this connectivity appears weakened or impaired after a night of total SD. Prior work only examined neuroimaging at two time points (rested and sleep deprived). We sought to further explore this effect by collecting repeated brain scans every 6 hours across a 39-hour period of total SD.

Methods: Twenty healthy adults (9 female; age=23.6, SD=4.7 years) underwent a night of normal sleep in the lab followed by a 39-hour period of SD. Beginning at 0900, rsfMRI scans were collected at 3T every 6-hours. Data were preprocessed and analyzed using standard pipelines using CONN v22. The effect of SD (time awake) on whole-brain seed-to-voxel rsFC using each amygdala as a seed region ($p < .001$ uncorrected voxel threshold, $p < .05$ FDR corrected).

Results: After controlling for time of day, time awake was linearly associated with increasing rsFC between the amygdala and medial prefrontal cortex. Further examination revealed a larger pattern suggesting that increased SD was associated with greater coupling between the amygdala and core nodes of the salience network, including the anterior cingulate cortex and bilateral insular regions, while leading to anticorrelated connectivity between amygdala and several regions, including sensory-motor cortex, visual cortex, and the precuneus.

Conclusion: Our findings suggest a more nuanced pattern than the traditional prefrontal-amygdala 'disconnect' hypothesis. Across repeated scans, prolonged sleep deprivation was associated with a progressive reorganization of amygdala-centric networks that shifted emotional circuitry toward stronger coupling with salience-network regions involved in threat detection and interoceptive monitoring. As sensory, visual, and attentional systems degrade with increasing sleep loss, the brain may adapt by relying more on amygdala-driven salience signals to maintain defensive hypervigilance despite reduced fidelity of external sensory input. This network shift, marked by weaker top-down control and stronger bottom-up salience processing, offers a dynamic, time-dependent account of how sleep loss reshapes emotional brain function.

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0226

RELATIONSHIPS BETWEEN PHYSICAL ACTIVITY AND CARDIOVASCULAR RISK FACTORS IN HABITUAL SHORT SLEEPERS

Paul Peyrel, Isabella Griffith, R. Caitlin Hebert, Robbie Beyl, Frank Greenway, Juan Lertora, Eric Ravussin, Prachi Singh

Pennington Biomedical Research Center

Introduction: Short sleep duration increases cardiovascular and metabolic risks, leading to an increase in cardiovascular mortality. Increasing sleep duration mitigates metabolic impairments. However, alternative strategies to reduce cardiometabolic risks in habitual short sleepers are lacking. Generally, increasing physical activity (PA) is recommended to reduce such risks, but its potential impact in habitual short sleepers is not completely understood. This study aimed to explore the relationship between wearables derived PA, and cardiometabolic risk factors in habitual short sleepers.

Methods: Sleep and PA patterns were objectively determined by a 7-day accelerometry recording in men ($n=17$) and women ($n=25$) aged 31.0 ± 7.3 years (mean $\pm$ SD) with habitual short sleep (i.e. < 390 min/night) and BMI of 28.9 ± 3.5 kg/m². Anthropometric were determined and body composition was assessed by whole-body DXA scan. Fasting blood was drawn to measure glucose, insulin, glycated hemoglobin, and lipid profile. Homeostasis Model Assessment for Insulin Resistance (HOMA-IR) was calculated. Pairwise correlations were performed between steps/day and the different measurements assessed in this study.

Results: Average sleep duration was 340 ± 41 min/night with a sleep efficiency of $90 \pm 4\%$. Participants spent 11.3 ± 1.4 hours/day in sedentary time, 62.6 ± 34.6 min/day to perform moderate-to-vigorous PA (MVPA) and walked 7875 ± 2287 steps/day. Insulin sensitivity (HOMA-IR) varied widely ranging from 0.43 to 5.87. There was no relationship between any objective measures of sleep and the number of steps/day ($p > 0.34$). No relationship was observed between steps/day and BMI, or lipid profile ($p > 0.26$). However, a negative correlation was observed between steps/day and body fat percent ($R = -0.36$, $p = 0.02$), as well as fasting insulin concentration ($R = -0.34$, $p = 0.03$). Further, steps/day were associated with higher fasting plasma glucoses ($R = 0.53$, $p < 0.01$) and a tendency for a decreased HOMA-IRs ($R = -0.28$, $p = 0.07$).

Conclusion: Habitual PA as determined by steps/day is associated with lower body fat percentage and insulin resistance in habitual short sleepers. Future interventional studies are needed to examine if increasing daily step count may partly mitigate the detrimental metabolic impact of short sleep.

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0227

SLEEP DEPRIVATION ALTERS LOCAL CONNECTIVITY: INSIGHTS INTO LOCAL SLEEP PROCESSESDavid Negelspach, Alisa Huskey, Jung won Cha, Kathryn Kennedy, William Killgore
University of Arizona

Introduction: Prolonged wakefulness disrupts the brain's capacity to maintain uniform arousal, giving rise to "local sleep" events in which cortical regions transiently exhibit sleep-like activity. Resulting unstable wakefulness reflects a breakdown in network stability and has been linked to impaired cognition and reduced vigilance. This study examined regional connectivity across a period of overnight sleep deprivation to determine whether changes in localized hemodynamic signals represent a hallmark of a sleep deprivation.

Methods: Individuals were recruited from the central Tucson area using fliers and online advertisements ($n = 20$). Interested participants completed an online screener to select for self-reported healthy sleep patterns and no current neurologic conditions or mental illnesses. Sleep deprivation took place over 39-hours with seven resting-state MRI. Polysomnography was recorded for baseline and recovery sleep-episodes. Functional data were analyzed and preprocessed using the MATLAB toolbox CONN (22.v). Local correlation (LCOR) represents a weighted average of nearby connections (10 mm Gaussian area), computed from the matrix of bivariate correlation coefficients estimated using a singular value decomposition of z-score normalized signals, reflecting local coherence.

Results: Over sleep deprivation, significant increases in LCOR occurred in large-scale cortical areas, primarily within the somatosensory and visual networks ($T = 9.9$, $p < .01$). LCOR cluster maxima were localized within the thalamus ($Z = 6.1$; $p < .01$), postcentral gyri ($Z = 5.94$; $p < .01$), and superior temporal gyri ($Z = 6.0$; $p < .01$). A secondary analysis at 37-hour sleep deprivation revealed a negative association between subsequent N3 (% total sleep time) and LCOR in the brainstem, centered at MNI (-4, -32, -52), extending adjacent to the pontine cistern ($\beta = -0.77$; $p < .01$; $R^2 = .56$).

Conclusion: Progressive sleep deprivation was associated with increased LCOR, primarily within the somatosensory and visual networks. Increased LCOR may reflect enhanced slow or infra-slow neuronal oscillatory activity. Prior to recovery sleep, LCOR in a region of the brainstem and pontine cistern was negatively associated with N3 (% total sleep time). Given the proximity to CSF, physiological artifacts related to pulsatile fluid dynamics cannot be excluded.

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0228

THE RATE OF FORGETTING DURING WAKE IS NOT EXACERBATED BY A NIGHT OF TOTAL SLEEP DEPRIVATIONDevon Hansen¹, Indy Silcox², Courtney Kurinec¹¹Washington State University, ²University of Surrey

Introduction: Sleep has been shown to slow the rate of forgetting compared to a period of wake, but no studies to date have explored

whether total sleep deprivation (TSD) also moderates the rate of forgetting compared to rested wakefulness. We investigated how well participants could retain information throughout the day on the day before, during, and the day after TSD.

Methods: 16 individuals (ages 18-38; mean age $25.8y \pm 7.9y$; 8 males, 8 females) completed a 4-day/3 night in-laboratory sleep study. Following a baseline 10h sleep opportunity, participants underwent a 38h TSD period followed by a 10h recovery sleep opportunity. Sleep periods were 22:00-08:00. Each day in the lab, participants were presented with a new list of words at around 09:30 and were asked to recall the words immediately, 4h, and 6h after study.

Results: A mixed-effects ANOVA with fixed effects of session (1, 2, or 3), test (immediate, 4h, or 6h later), and their interaction, with a random intercept over subjects, revealed a significant effect of test ($F=22.23$, $p < 0.001$), but no significant effect of session or session x test interaction ($F < 2.26$, $p > 0.10$). Relative to immediate testing, recall decreased 27.3% at 4h and 26.1% at 6h. Post-hoc tests on the effect of test and the session x test interaction revealed that accuracy on the immediate recall test was better than accuracy 4h or 6h later ($p < 0.001$), but only in sessions 2 and 3. The pattern was similar in session 1, but not statistically significant.

Conclusion: In line with the established forgetting curve, participants had better memory for the words at immediate recall than at 4 and 6h later. Contrary to expectations, sleep deprivation did not appear to exacerbate the forgetting rate, even though participants had been awake for 25.5h at study. Future research should include tests at greater delays. Additionally, it should investigate whether chronic and acute sleep deprivation have differential effects on the forgetting rate.

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0229

THE ODDS RATIO PRODUCT IN HEALTHY PEOPLE WITH HABITUAL SHORT SLEEP DURATIONAudrey Stegman¹, Michelle Kubicki¹, Grace Zimmerman¹, Kelly Baron¹, Krishna Sundar², Magdy Younes³, Kenneth Wright⁴, Chris Depner¹¹University of Utah, ²UC Davis Medical Center, ³University of Manitoba, ⁴University of Colorado

Introduction: Insufficient sleep, fragmented sleep, disrupted slow wave sleep are all associated with risk for diabetes. Conventional sleep staging methods of analyzing polysomnography do not fully encompass the depth of sleep. The odds ratio product (ORP) is a continuous measurement of sleep depth, but it is unknown if ORP is linked to insulin sensitivity. Thus, we assessed ORP and insulin sensitivity in healthy young adults with habitual insufficient sleep, hypothesizing deeper sleep will be linked to better insulin sensitivity.

Methods: We analyzed data from 16 participants (9 female; aged $21.1 \pm 3.5y$; BMI $21.4 \pm 2.1kg/m^2$ [mean $\pm$ SD]) with habitual sleep $< 6.5h$ per night. Participants completed 2-weeks of ambulatory monitoring with actigraphy. Following at home monitoring participants underwent overnight polysomnography to calculate ORP, a QEEG derived measure of sleep depth (ranging from 0 [deeply asleep] to 2.5 [fully awake]), and completed the Pittsburgh Sleep Quality Index (PSQI) survey to assess subjective sleep quality. Oral Glucose Tolerance Testing (OGTT) was completed to calculate Matsuda Index (MI) insulin sensitivity.

Results: Average PSQI was 5.1 ± 2.4 (mean $\pm$ SD), TST was 5.48 ± 0.9 h, ORP during the total recording time was 0.79 ± 0.23 , and MI was 7.6 ± 4.4 . Linear regression indicated both lower ORP and shorter TST were individually associated with worse MI (all $p < 0.05$). Yet, when included together in the model, neither were significant. Additionally, shorter TST was associated $p < 0.05$ with lower ORP.

Conclusion: Participants exhibited insufficient sleep indicated by short TST and average PSQI > 5 . As expected, shorter TST was associated with worse MI, indicating higher diabetes risk. Interestingly, shorter TST also associated with lower ORP, suggesting deeper sleep possibly driven by greater homeostatic sleep pressure. However, deeper sleep indicated, by ORP, was also associated with worse MI in this context of adults with habitual insufficient sleep, counter to our hypothesis. These preliminary analyses suggest among adults with insufficient sleep, deeper sleep depth may not confer metabolic benefit. Future analyses will compare ORP to MI among adults with > 7 h sleep/night to clarify whether the ORP-insulin sensitivity relationship differs under conditions of habitual adequate sleep.

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0230

SLEEP DISTURBANCES AND RISK OF SUBSEQUENT DISABILITY AMONG OLDER ADULTS IN INDIA: EVIDENCE FROM LASI-DAD

Waad Ali¹, Muhammad Thalil²

¹Sultan Qaboos University, ²Pennsylvania State University

Introduction: Sleep disturbances are common in older adults and may accelerate physical decline through disrupted restoration, inflammation, and cognitive impairment. Despite growing evidence linking sleep disturbances to functional deterioration, little is known about these associations in low- and middle-income countries undergoing rapid aging. India's rising burden of multimorbidity and disability underscores the need to identify modifiable determinants of independence. This study examined prospective associations between sleep disturbances and ADL and IADL disabilities.

Methods: We analyzed longitudinal data from 2,469 participants aged ≥ 60 years in the LASI-DAD (2017–2018; 2022–2024), with baseline sleep disturbances assessed using four indicators (difficulty initiating sleep, difficulty maintaining sleep, early morning awakening, and daytime restlessness). Functional status was measured using ADL and IADL performance. Logistic regression models were used to examine the association between sleep disturbance and disability over a five-year period. The models were adjusted for baseline functional status, age, sex, education, BMI, chronic conditions, and depressive symptoms.

Results: Participants reporting any sleep disturbances had significantly greater odds of subsequent ADL disability (odds ratio [OR] = 1.32, confidence interval [CI]: 1.11–1.57) and IADL disability (OR = 1.25, CI: 1.02–1.54). When examining individual disturbances, difficulty initiating sleep predicted higher odds of ADL (OR = 1.31, CI: 1.07–1.62) and IADL disabilities (OR = 1.29, CI: 1.00–1.66). Difficulty maintaining sleep was similarly associated with increased ADL (OR = 1.28, CI: 1.05–1.56) and IADL (OR = 1.29,

CI: 1.02–1.64) disability. Early morning awakening showed the strongest association, predicting a higher ADL disability risk (OR = 1.36, CI: 1.11–1.66). Daytime restlessness was not associated with ADL or IADL outcomes.

Conclusion: Sleep disturbances, particularly difficulty in initiating or maintaining sleep and early morning awakening, predict a higher risk of functional disability among older Indian adults. As sleep disturbances are modifiable, screening and early intervention may help preserve the independence of older adults. These findings highlight the importance of identifying and addressing sleep disturbances to prevent functional decline in the aging population.

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0231

BRAIN TRANSCRIPTOMICS AND SYNAPTOSOME PROTEOMICS REVEAL CELLULAR STRESS AND SYNAPSE-SPECIFIC COMPENSATORY CHANGES INDUCED BY CHRONIC SLEEP DISRUPTION

Claudia Espinosa-Garcia¹, Dilpreet Kour¹, Upasna Srivastava¹, Sneha Malepati¹, Prateek Kumar¹, Samira Parhizkar², Wooyoung Eric Jang¹, Rashmi Kumari¹, Maria Henley¹, Xinran Liu³, Sara Bitarafan⁴, Brendan Tobin⁵, Levi B. Wood⁴, Victor Faundez⁶, Srikant Rangaraju¹

¹Department of Neurology, Yale University, ²Department of Neurology, Washington University, ³Center for Cellular and Molecular Imaging, Yale University School of Medicine, ⁴Parker H. Petit Institute for Bioengineering and Biosciences, Georgia Institute of Technology, ⁵George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, ⁶Department of Cell Biology, Emory University

Introduction: Sleep disruption (SD) negatively impacts several aspects of cognitive function and increases the risk of developing dementia, including Alzheimer's disease (AD). Synapses are particularly vulnerable to sleep loss and therefore represent a major target to prevent cognitive dysfunction. SD impairs cognition by altering synaptic molecular composition, ultrastructure, and function. Extensive evidence indicates that SD effects are especially detrimental when sleep loss is chronic. This study aims to investigate the impact of chronic SD on brain transcriptomic and cellular compartment-specific proteomic signatures to identify genes, proteins, and pathways that might confer AD risk.

Methods: Male wild-type mice (6.5-month-old) were randomly assigned to an undisturbed sleep control group and an SD group (N=10/group). For chronic SD, mice were placed into automated sleep fragmentation chambers that include a swipe bar, set to move every 30 sec for six hours per day, over six weeks. Next day, mice were euthanized and brains were quickly removed, bulk brain tissue was snap frozen and crude synaptosomes (P2 fraction) were prepared immediately by differential centrifugation. RNA was isolated from frozen brain tissue and then analyzed by RNAseq to identify differentially-enriched genes (DEGs). Brain homogenate and P2 fraction proteins were then analyzed by label-free quantitative mass spectrometry to identify differentially-enriched proteins (DEPs) and biological pathways by gene set variation analysis.

Results: Chronic SD mainly increased the gene expression of chaperones/heat shock proteins associated with cellular stress and the unfolded protein response. In contrast with a subtle transcriptional response, the effects of chronic SD on the brain proteome were much greater (518 DEPs in homogenate). Remarkably,

chronic SD exerted unique proteomic effects on the synapse (556 DEPs in P2 fraction): Increased DEPs include cognitive resilience proteins, suggesting a compensatory mechanism, while reduced DEPs include mitochondrial proteins, potentially representing synaptic energy failure. The p38 MAPK pathway, implicated in the development and progression of AD, was uniquely increased in the synaptic compartment, supporting p38 inhibition as a neuro-protective strategy for improving synaptic pathology induced by chronic SD.

Conclusion: These results nominate synaptic-specific candidates for future mechanistic validation that might help clarify chronic SD effects linked to synapse dysfunction and AD risk.

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0232

VARIATION IN RESPONSE TO SLEEP DEPRIVATION IN DROSOPHILA MELANOGASTER

Maria Colt, Susan Harbison

National Institutes of Health

Introduction: Sleep deprivation is known to negatively impact cognitive performance, metabolism, and immune responses, yet the genetic basis for variability in the response to sleep loss is not fully understood.

Methods: To address this gap in our knowledge, we assessed sleep behavior across more than 100 *Drosophila melanogaster* lines from the *Drosophila* Genetic Reference Panel 3 (DGRP3), with

the goal of analyzing 252 distinct genotypes. We measured sleep and activity over two undisturbed days, followed by 12 hours of mechanical sleep deprivation. We then recorded recovery sleep over two subsequent days. We tested each genotype in three independent replicates, and used the Canton-S B strain as a control in every experiment.

Results: Our results confirm that the sleep deprivation protocol was effective, as all genotypes experienced sleep loss, and there was variation in the degree of sleep rebound observed the following day. Notably, only a small proportion (7%) of genotypes did not exhibit sleep rebound. Heritability estimates for total sleep over the five-day experimental period ranged from 0.39 to 0.50, indicating a considerable genetic component influencing sleep behavior. Both genotype and sex were found to be significant factors in shaping behavioral responses to sleep deprivation, supporting the prospect of mapping these traits genetically. Furthermore, incubator-specific effects were detected for the Canton-S B controls, highlighting the contribution of environmental factors to sleep variation.

Conclusion: In the future, we will utilize the genetic information available for the DGRP3 lines to conduct genome-wide association studies aimed at pinpointing genetic variants linked to resilience against sleep deprivation. We will perform subsequent functional studies to validate candidate genes. Taken together, this research will enhance our understanding of the genetic determinants that drive variability in sleep deprivation responses.

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0233

ASSOCIATIONS BETWEEN ACTIGRAPHIC SLEEP MEASURES AND AREAL BONE MINERAL DENSITY IN ADOLESCENTS

Lindsay Nye, Pin-Wei Chen, Jessica Decker, Babette Zemel,
Jonathan Mitchell
Children's Hospital of Philadelphia

Introduction: Osteoporosis is one of the leading chronic diseases that can have origins in early life through suboptimal bone accretion. We know that diet and physical activity can enhance bone accretion, and there are emerging data suggesting sleep patterns may also be a determinant of bone accretion. We therefore aimed to evaluate the associations between actigraphic nighttime sleep measures with areal bone mineral density (aBMD) in adolescents.

Methods: Participants were enrolled in the Sleep and Growth Study 2 (S-Grow2), a cohort of typically developing adolescents in 7th grade (12-13y) recruited from the Philadelphia area. Participants wore a wrist actigraphic sleep monitor (GENEActiv, ActivInsights) for two weeks and the motion data were processed using GGIR to estimate sleep patterns. They also completed a dual energy X-ray (DXA) scan to estimate areal bone mineral density (aBMD) at multiple skeletal sites and expressed as age and sex specific Z-scores. Cross-sectional, multiple regression analyses tested the associations of average nighttime sleep measures (sleep duration, timing, and efficiency) with aBMD Z-scores (total body less head, lumbar spine, total hip, femoral neck, and the distal radius). Models included a quadratic term for sleep measures, and adjusted for sex, race, daily minutes of physical activity, body mass index z-score, and dietary calcium intake.

Results: Participants (n=302) were 65% white and 47% female. Sleep period duration demonstrated a U-shaped association with aBMD z-scores at the femoral neck ($p=.023$) and total hip ($p=.008$), with both shorter and longer sleep durations linked to higher areal bone mineral density. Sleep efficiency showed an inverse U-shaped relationship with aBMD z-scores at the distal radius ($p=.01$), such that both lower and higher sleep efficiency were associated with lower areal bone mineral density. Sleep timing was not associated with any aBMD measures.

Conclusion: Our cross-sectional results illustrate non-linear relationships between sleep and areal bone mineral density in adolescents aged 12-13y. This cohort is actively being followed up at 1 year intervals in 8th and 9th grades and future analyses will reveal how changes in sleep impact bone accretion during this developmental window.

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0234

NAPPING AND WEEKEND OVERSLEEP INCREASE WITH SOCIAL JETLAG AND DIFFER BY RACE AND ETHNICITY IN U.S. CHILDREN

Zoe Meredith¹, Olivia Gerber¹, Lauren Hartstein², Michael Grandner³,
John Harsh¹

¹University of Colorado Boulder, ²University of Arizona College of Medicine Tucson, ³University of Arizona

Introduction: Social jetlag (SJL), resulting from later sleep timing on weekends compared with weekdays, is common in adults and

adolescents, and often contributes to weekday sleep loss that may be accompanied by compensatory weekend oversleep. In children, SJL emerges early, increases with age, and has been linked to consequences such as higher BMI and cognitive and behavioral dysfunction. Little is known about whether children with SJL engage in compensatory sleep behaviors for weekday sleep loss and whether these behaviors vary across racial/ethnic groups.

Methods: We examined weekend oversleep and daytime napping in 5,936 Non-Hispanic White (50.7%), Asian (11.6%), Hispanic/Latino (20.8%), and Black/African-American (16.9%) preschool (2-5 y) and school-age (6-11 y) children from the NIH Environmental Influence on Child Health Outcomes (ECHO) study. Caregivers reported demographic information and sleep outcomes via the ECHO Demographics of Child Questionnaire and the ECHO Child Sleep Health Questionnaire. Weekend oversleep was calculated as the difference between weekend and weekday sleep duration. SJL was categorized as ≤ 30 minutes, 31-60 minutes, and ≥ 60 minutes. Linear models examined the main and interaction effects of age, sex, and race/ethnicity for all outcomes.

Results: In both preschool and school-age children, weekend oversleep (prevalence and duration) and napping (prevalence of at least one nap per week and weekly total nap duration) increased across SJL categories (all $ps < .001$). Controlling for age, weekend oversleep and napping were more prevalent and of longer duration for Black/African-American and Hispanic/Latino children compared with White and Asian children, with more pronounced differences in school-age children (all $ps < .001$).

Conclusion: Greater weekend oversleep and napping with increasing SJL may reflect effects of SJL on weekday sleep duration and efficiency. Racial/ethnic differences in these behaviors were evident and may relate to group differences in SJL and/or sleep duration. Understanding these relationships is important for addressing sleep health disparities and promoting more consistent and restorative sleep in childhood.

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0235

CHRONOTYPE AND AMBULATORY LIGHT HISTORY: MORNING-TYPE ADOLESCENTS ARE EXPOSED TO MORE BRIGHT LIGHT THAN EVENING-TYPES

Elaine Poole, Allison Monterastelli, Charmane Eastman,
Stephanie Crowley
Rush University Medical Center

Introduction: Circadian clocks of morning-types (M-types) have earlier phases than evening-types (E-types) as measured by dim light melatonin onset (DLMO). We investigated whether older adolescent M- and E-types differ in self-selected daily light exposure when dark/sleep duration is fixed and consistent with their phase type.

Methods: The Smith Morningness Questionnaire was given to 74 older adolescents at screening. Those who scored in the top and bottom 10% were compared. There were 7 M-types (scored 43-49) and 5 E-Types (scored 19-25). These twelve adolescents (7 male; 18.5-20.9 years) followed an individualized 9-h sleep/dark schedule at home for one week with no other light exposure restrictions. Waking (15h) ambient photopic light was measured via a chest-level sensor (ActLumus, Condor Instruments). Then,

salivary DLMO was measured in the lab. Each participant's number of daily minutes ≥ 30 , 100, 500, 1000, and 5000 lux were calculated. We identified the first (onset) and last (offset) times at which participants were exposed to bright light (≥ 500 lux) each day; clock times and hours relative to scheduled wake were examined. M-type wake times ranged from 07:00-09:00; E-type wake times ranged from 09:00-11:00. All daily values were averaged across the week.

Results: DLMO was earlier in M-types compared to E-types (21:06 $\pm$ 00:48 vs. 23:33 $\pm$ 00:36, $p < .001$). Daily minutes ≥ 30 and ≥ 100 lux did not differ between groups. M-types received more minutes ≥ 500 (114 $\pm$ 67.1 vs. 38.1 $\pm$ 25.6, $p = .040$), ≥ 1000 (84.5 $\pm$ 50.7 vs. 24.4 $\pm$ 18.2, $p = .031$), and ≥ 5000 (39.6 $\pm$ 24.2 vs. 8.0 $\pm$ 7.5, $p = .013$) lux than E-types. Clock time of bright light onset was ~ 2 h earlier in M-types compared to E-types (10:09 $\pm$ 01:17 vs. 12:03 $\pm$ 00:59, $p = .020$) but did not differ between groups when examined relative to wake. Clock time of bright light offset did not differ between groups. Bright light offset was ~ 2.5 h later relative to wake in M-types compared to E-types (9.4 $\pm$ 1.3h vs. 6.8 $\pm$ 3.1h, $p = .075$), but this was only a trend.

Conclusion: Morning-type adolescents received 3-4 times more daily bright light (≥ 500 , ≥ 1000 , ≥ 5000 lux) than evening-types, which is likely driven by earlier waking behavior. Therefore, evening-types may be at a disadvantage for obtaining bright light. These differences may have downstream effects on circadian entrainment mechanisms.

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0236

DEVELOPMENT OF THE HIPPOCAMPUS IN PRESCHOOL-AGE CHILDREN IN RELATION TO DAYTIME AND NIGHTTIME SLEEP

Lindsey Mooney¹, Karolina Rusin², Erin Ratliff³, Tracy Riggins³, Rebecca Spencer²

¹University of California, Davis, ²University of Massachusetts, Amherst, ³University of Maryland

Introduction: Development of the hippocampus is critically supported by sleep. Although previous research highlights the importance of both daytime and nighttime sleep for cognitive and neural outcomes, less is known about how hippocampal development across early childhood shapes sleep behavior, particularly in the shift away from daytime naps that is characteristic of the preschool years. As the hippocampus matures, children may consolidate memories more readily without relying on daytime naps, meaning that hippocampal development may drive the transition from biphasic to monophasic sleep (Spencer & Riggins, 2024).

Methods: Young children (N=52; M=3.97 years, SD=0.68 years, Range=3.05-5.98 years, 25 males) wore actigraphs for 3-16 days to assess sleep patterns. Nap frequency was variable, ranging from 7.4%-100% of days with naps (M=69.1%; SD=26.9%). 24-hr sleep time was calculated as the sum of both nap and overnight sleep and a nap ratio reflects the proportion of 24-hr sleep obtained in naps. T2-weighted MRI scans were processed using ASHS (Automatic Segmentation of Hippocampal Subfields) software to segment the CA1, subiculum, and CA2-4 with dentate gyrus (CA2-4+DG); volumes were adjusted for participant age.

Results: Correlations revealed that nap ratio was negatively correlated with CA2-4+DG volume, $r(50) = -.28$, $p = .04$. This was not

the case for the CA1, $r(50) = -.15$, $p = .30$; or subiculum, $r(50) = -.013$, $p = .35$. In an ANOVA predicting raw CA2-4+DG from 24-hour sleep, nap ratio, age, and sex; sex significantly predicted CA2-4+DG volume, $F(1,46) = 4.71$, $p = .04$. Nap ratio was a marginal predictor, $F(1,46) = 3.82$, $p = .06$, but neither 24-hour sleep time, $F(1,46) = 2.09$, $p = .15$, nor age, $F(1,46) = 0.59$, $p = .45$, was predictive of CA2-4+DG.

Conclusion: Hippocampal subfield volumes may be linked to nap ratio of overall sleep. These connections align with a potential link between developing hippocampal subfields and a reduction in the need for daytime memory consolidation via naps. Given that the CA2-4+DG and subiculum develop later and more variably than the CA1 (Canada et al., 2021), those subregions may be the catalyst for the also variable nap transition timing.

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0237

SCHOOL-DAY PHASE ADVANCING MORNING BRIGHT LIGHT EXPOSURE IS LIMITED IN TEENS: SUPPORT FOR LATE SCHOOL START TIMES AND PERMANENT STANDARD TIME

Allison Monterastelli, Elaine Poole, Nina Blaise, Charmane Eastman, Stephanie Crowley
Rush University Medical Center

Introduction: It is assumed that adolescents are exposed to sunlight during their morning commute to school, a time of day when bright light can phase advance circadian rhythms (make them earlier). We calculated the duration of bright light that adolescents in Chicago, IL (41.88°N, 87.63°W) received before school, and how school start times and the biannual time change between standard time (ST) and daylight savings time (DST) impacted this duration.

Methods: 72 (41F) adolescents (14.3-18.0 years) wore light medallions (Actiwatch Spectrums) at chest-level for 11 school days. The average duration of bright light exposure (> 1000 photopic lux) from wake-up time to 15 minutes after school start time was calculated for each participant. Mornings were excluded if the participant did not wear their medallion $> 50\%$ of their commute or went to school late, leaving 3-11 mornings per participant (Median=8 days). Those with early ($< 08:00$, $n=25$) and late ($\geq 08:00$, $n=47$) school start times were compared using unpaired t-tests. For 8 participants, the biannual time change occurred midway through the study. Average school-day morning bright light duration during DST and ST were compared using paired t-tests. Results are reported as Mean $\pm$ SD.

Results: The average duration of morning bright light exposure was 7.4 $\pm$ 8.0 minutes. Those with later school start times received bright light for a longer duration than those with earlier school start times (9.0 $\pm$ 8.6 vs. 4.2 $\pm$ 5.7 minutes; $p = 0.006$). The groups did not differ in commute time ($p = 0.360$) which ranged from 4-100 minutes, or sunrise time ($p = 0.286$), which ranged from 05:32-07:18. Participants were exposed to bright light for over twice as long during ST compared to DST (11.3 $\pm$ 6.6 vs. 4.9 $\pm$ 6.8 minutes; $p = 0.00003$).

Conclusion: Adolescents living in Chicago were exposed to less than 10 minutes of bright light in the morning before school. The duration was halved when school started before 08:00 and when the clock time relative to sunrise was delayed during DST compared to ST. These findings support later school start times and permanent ST to maximize phase advancing morning light

which could advance the fall asleep times of adolescents and increase their inadequate sleep durations.

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0238

SELF-REPORTED SLEEP PATTERNS AND DAYTIME FUNCTIONING IN A NATIONALLY REPRESENTATIVE SAMPLE OF U.S. YOUTH

Lu Dong¹, Wendy Troxel²

¹Stony Brook University, ²RAND Corporation

Introduction: Adolescents face biologically delayed sleep and competing demands, yet post-pandemic national data on sociodemographic sleep disparities are sparse. We examined sleep patterns and daytime sleepiness, in a nationally representative sample of youth from the 2024 American Youth Panel (AYP).

Methods: AYP is a probability-based, nationally representative sample of adolescents ages 12–21 oversampled in California, Florida, New York, and Texas. We analyzed self-reported school-night bedtimes and waketimes, yielding an estimate of sleep duration, and past-month sleepiness using linear and ordinal regressions adjusted for sex, age, and school enrollment status.

Results: The analytic sample included 724 youth (Mean age = 16.3; 42% female): 528 White, 79 Black, 35 Asian/Pacific Islander, 14 American Indian/Alaskan Native, and 63 Other race youth; 184 were Hispanic. Most (78%) were enrolled in school (16% middle, 48% high, 14% postsecondary). Youth reported average bedtimes of 22:36 and waketimes of 6:45, yielding 8.12 hours of sleep; 31% fell asleep in class/work at least once in the past month. Older age predicted later bedtime ($b = 0.20$, $p < 0.001$), waketime ($b = 0.11$, $p < 0.001$), and shorter duration ($b = -0.09$, $p < 0.001$), but not sleepiness. Non-enrolled youth slept longer ($b = 0.34$, $p = 0.02$) and were less sleepy ($b = -1.62$, $p < 0.001$). Youth in Pacific region (oversampled for California) woke 30 minutes later ($p = 0.003$) and slept ~22 minutes longer ($p = 0.019$). Asian/Pacific Islander youth had later bedtimes ($b = 0.74$, $p = 0.002$) and waketimes ($b = 0.75$, $p = 0.006$). Black ($b = 0.70$, $p = 0.01$) and Hispanic youth ($b = 0.55$, $p = 0.004$) reported greater daytime sleepiness than White and non-Hispanic peers despite comparable duration.

Conclusion: Structural factors likely drive sleep deficits. Youth not enrolled in school slept more and were less sleepy, indicating rigid schedules restrict sleep opportunity. Longer sleep in the Pacific region may reflect policies such as California's later start times. Greater sleepiness among Black and Hispanic youth, despite similar duration, highlight disparities in sleep quality. These findings underscore the need for coordinated state and national policy action.

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0239

SLOW WAVE ACTIVITY TRAJECTORIES PREDICT ATTENTION-DEFICIT/HYPERACTIVITY, LEARNING AND INTERNALIZING DISORDERS AS CHILDREN GROW INTO ADULTS

Julio Fernandez-Mendoza¹, Anthony Rahawi², Kaylee Rice², Susan Calhoun³, Alexandros Vgontzas², Edward Bixler², Christina Stetter², Lan Kong², Jidong Fang²

¹Penn State University, Hershey, ²Penn State College of Medicine, ³Penn State Health

Introduction: Changes in slow wave activity (SWA) are indicative of brain maturation, particularly in the transition to adolescence. However, whether abnormal maturational trajectories of SWA predict neurodevelopmental and psychopathological disorders has remained unclear given the lack of longitudinal studies across the lifespan.

Methods: A total of 674 participants from the Penn State Child Cohort, a randomly-selected population-based sample, underwent 9-hour in-lab polysomnography studies in childhood (median age 9y), adolescence (median age 16y), and young adulthood (median age 25y) with a median time-to-follow-up of 15y. Growth mixture models for clustering of longitudinal data series were used to identify latent age-related classes (trajectories) of log-SWA, while adjusting for childhood sex, age, race/ethnicity, diagnoses or medication use. Mixed-effects models were fitted to test the association of log-SWA trajectories with presence of attention-deficit/hyperactivity (ADHD), learning (LD), and internalizing (ID) disorders and suicidality from age 5 through 30, while adjusting for sex, race/ethnicity, insomnia symptoms, and body mass, apnea/hypopnea, and periodic limb movements indices.

Results: SWA showed four cubic maturational trajectories, that were significantly associated with the rate of neurodevelopmental and psychiatric disorders ($p = .02$). Compared to the reference SWA trajectory ($n = 357$), the trajectory with a delayed peak-SWA in childhood ($n = 182$) had a higher rate of LD in childhood ($p < .01$). The trajectory with lowest SWA since childhood through young adulthood ($n = 53$) showed a higher rate of ADHD since childhood ($p = .002$). The trajectory with highest SWA in childhood and largest cubic spline ($n = 82$) showed a higher rate of ID and suicidality in young adulthood ($p = .03$).

Conclusion: Abnormal trajectories of the maturing sleeping brain, as indexed by SWA, are differentially associated with childhood-onset neurodevelopmental disorders and adult-onset internalizing psychopathology.

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0240

SLEEPING WITH ONE EYE OPEN: ASSOCIATIONS BETWEEN RURAL NEIGHBORHOOD ADVERSITY, BEDTIME PARENTING, AND YOUNG CHILDREN'S ACTIGRAPHY-ASSESSED SLEEP

Lauren Philbrook, Leo Li, Delaney Lobell, Natalie Woodson
Colgate University

Introduction: An emerging body of literature, primarily focused on urban contexts, has demonstrated that adverse neighborhood economic and social conditions are associated with poor child sleep (Tomfohr-Madsen et al., 2020). Rural settings may impact children's sleep differently; for example, families may face less crowding but more social isolation. The present study sought to examine adverse neighborhood conditions in rural contexts as predictors of young children's objectively-assessed sleep. Additionally, more parent involvement at young children's bedtime has been found to predict better child sleep (Philbrook et al., 2022). Thus, the present study explored parenting practices at children's bedtime as a protective factor in the association between rural neighborhood adversity and children's sleep.

Methods: Participants were 76 children (Mage = 4.01, SD = .87, 52% girls) and their families living in rural/semi-rural central New York. Caregivers reported on neighborhood conditions. Children wore an actigraph for seven nights, from which average nighttime sleep minutes, latency, and efficiency were derived. Caregivers videorecorded one night of their child's typical bedtime routine, from which trained raters scored the length of parental engagement in quiet activities (e.g., reading, singing) with the child.

Results: Partial correlations controlling for family and child demographics demonstrated that poorer neighborhood conditions (litter, noise) were associated with fewer child sleep minutes, $r(70) = -.24$, longer sleep latency, $r(70) = .25$, and poorer sleep efficiency, $r = -.27$, p 's < .05. Lower neighborhood safety was associated with fewer child sleep minutes, $r(70) = -.28$, $p = .019$. There was a significant interaction indicating that higher neighborhood safety was associated with shorter sleep latency only for children whose primary caregiver engaged in more quiet activities with the child ($\beta = .35$, $p = .007$) at bedtime.

Conclusion: These findings suggest that adverse rural neighborhood conditions negatively impact young children's objective sleep parameters, and that distal neighborhood factors interact with proximal parenting practices to shape children's sleep. In rural neighborhoods in which families feel less safe, parental involvement may not buffer threats to safety and emotional security that interrupt children's ability to fall asleep. The results demonstrate the disparities experienced among rural caregivers in helping their children to sleep as well as the need to ensure all families' access to affordable and safe housing.

Support (if any):

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0241

EVALUATION OF FOUR COMPUTATIONAL METHODS TO ESTIMATE DIM LIGHT MELATONIN ONSET IN PEDIATRIC POPULATIONS

Isabella Sagman¹, Rebecca Cox², Lauren Hartstein³

¹Vassar College, ²Washington University in St. Louis, ³University of Arizona College of Medicine Tucson

Introduction: Dim light melatonin onset (DLMO) is the gold standard circadian phase marker in humans. There are several methods that can be employed to estimate DLMO from salivary or plasma melatonin levels. These methods include utilizing fixed thresholds (3 pg/ml, 4 pg/ml), individual thresholds (2 SD above baseline), and the hockey stick method. The extant literature suggests that DLMO estimates in adults and adolescents are influenced by DLMO quantification methods. To date, no studies have compared these methods for calculating DLMO in pediatric populations. Given that measuring DLMO in children presents unique methodological challenges, research is needed to compare agreement across calculation methods.

Methods: Salivary melatonin was collected from 49 healthy children aged 3.3 – 6.0 years and retrospectively analyzed. Children maintained a consistent sleep/wake schedule for 7 days. On the evening of the 8th day, children provided saliva samples every 30 min until 1 h past habitual bedtime under dim light conditions (< 10 photopic lux). Saliva was collected by having each child

mouth/chew on absorbent cotton swabs. DLMO was compared across four methods of calculation: 4 pg/ml fixed threshold, 3 pg/ml fixed threshold, individual thresholds calculated as 2 SD above baseline levels, and the hockey stick method.

Results: Intraclass correlations among the four methods were all significant ($p < 0.001$), with the strongest agreement observed between the 3 pg/ml, 4 pg/ml, and hockey stick methods. DLMO values from all methods were positively correlated with bedtime, sleep onset, midsleep, and sleep offset ($p < 0.001$). Although the 2 SD method was more discrepant from the other three estimation methods on average, it did yield a more plausible DLMO estimate in one individual identified as a high secretor.

Conclusion: The 3 pg/ml, 4 pg/ml, and hockey stick methods provide reliable estimates of DLMO in young children, whereas the 2 SD method may yield a more accurate DLMO estimation in edge cases of high or low melatonin secretors. More research is needed to generalize these overall findings to other pediatric populations, including those with known variability in melatonin output.

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0242

PRE-BEDTIME SMARTPHONE USE PREDICTS HIGHER WITHIN-PERSON LIKELIHOOD OF LATE-NIGHT SMARTPHONE USE AMONG ADOLESCENTS: THE SBU MEDIA STUDY

Gina Mathew¹, Issac Rodriguez¹, David Reichenberger², Dimitri Christakis³, Lauren Hale¹

¹Stony Brook Medicine, ²Oregon Health & Science University,

³Seattle Children's Research Institute

Introduction: Nighttime digital media can adversely impact sleep through sleep displacement and/or disruption. One potential mechanism causing nighttime use is that "usage begets usage." media use prior to bedtime may prime an individual to use their smartphone again during the nighttime. To test this hypothesis, we examined whether objectively measured smartphone use prior to bedtime predicted a higher likelihood of late-night smartphone use at the daily, within-person level among a national, diverse sample of adolescents.

Methods: Adolescents who owned or were the primary user of a personal smartphone from across the U.S. ($n = 229$; 47%F, 46%M, 7% other) were recruited into the Stony Brook University Measuring Electronic Devices in Adolescents (MEDiA) Study. Participants answered a survey querying sociodemographic characteristics and sleep timing and then installed RealityMeter, which passively measured objective smartphone use ($M \pm SD = 16.8 \pm 13.7$ days). Multilevel logistic models with random intercepts nested within individuals assessed whether person-mean-centered total ($M = 18.51m$), social media (e.g., TikTok, Instagram, Facebook, YouTube; $M = 8.53m$), and non-social media (e.g., messaging, gaming, streaming videos/movies; $M = 9.99m$) smartphone use ≥ 30 minutes in the hour before the sample-mean of self-reported bedtime ("pre-bedtime," defined as 22:24-23:23 for school nights; 23:24-0:23 for non-school nights) predicted higher likelihood of ≥ 30 minutes of usage during the night (0:00-5:00 school nights;

1:00-6:00 non-school nights; $M=46.74m$) at the within-person, nightly level (≥ 30 minutes of usage: pre-bedtime total=28.5%, social media=10.0%, non-social media=11.6% of evenings; nighttime total=40% of nights).

Results: Within-person findings demonstrated that on evenings when adolescents engaged in ≥ 30 minutes of pre-bedtime smartphone use compared to when they did not engage in ≥ 30 minutes pre-bedtime use, likelihood of ≥ 30 minutes nighttime smartphone use was higher, with overlapping confidence intervals for the three categories of pre-bedtime media use: total pre-bedtime media (OR=1.45; 95%CI=1.19-1.77), social media (OR=1.23; 95%CI 0.92-1.65), and non-social media (OR=1.38; 95%CI=1.04-1.84) use.

Conclusion: After evenings when adolescents used their smartphone prior to sleeping, they had a higher likelihood of using their smartphone later that same night, which increases the risk of later bedtimes and opportunity for sleep disruption. Reducing pre-bedtime smartphone use may serve as a strategy to reduce nighttime use and improve sleep, health, and wellbeing.

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0243

SLEEP MICROARCHITECTURE PREDICTS RISKY DECISION MAKING IN ADOLESCENTS AND YOUNG ADULTS

Autumn Vance, Melissa St. Hilaire, Amanda Cremonese-Caira, Laura Kurdziel
Merrimack College

Introduction: During adolescence, biological development produces a pronounced shift toward later bedtimes and rise times. This chronotype change often conflicts with early school or work schedules, leading to reduced sleep duration and poorer sleep quality. Insufficient or disrupted sleep is known to heighten emotional reactivity and impair cognitive control, yet its role in risky decision making during adolescence remains unclear. The present study examined whether sleep quality, indexed through macro- and microstructural sleep features, relates to risk-taking behavior in adolescents and young adults.

Methods: Forty-two participants (ages 15–34 years; $M=18.92$, $SD=3.09$; screened to ensure normal color vision) completed one night of sleep monitoring using the Sleep Profiler, which provides automated measures of sleep architecture and EEG-derived microarchitecture (e.g., sigma power). Participants then completed the Balloon Emotional Learning Task (BELT) the following morning as well as self-report questionnaires; BELT is a computerized paradigm assessing risk taking and adaptive learning.

Results: Participants exhibited total sleep times below recommended levels (Mean TST=6.01, $SD=1.11$). Using age-controlled, bootstrapped partial correlations (1,000 samples), robust relationships emerged between N2/N3 sigma activity and task behavior. Higher NREM Sigma was associated with risk aversion, including fewer total adjusted pumps ($r = -.39$, $p=.009$), fewer balloon pops ($r = -.32$, $p=.033$), and fewer adjusted pumps in the variable-risk condition ($r = -.38$, $p=.011$). In contrast, REM sleep was associated with successful performance: greater REM duration and

percentage were associated with more points earned (REMtime: $r=.32$, $p=.032$; REM%: $r=.36$, $p=.015$). Traditional macro-sleep measures (TST, sleep efficiency, WASO) were not significantly related to behavioral performance ($r < .25$, $ps > .10$), suggesting that sleep microarchitecture is more predictive of next-day risk-related behavior than overall sleep duration or continuity.

Conclusion: These findings suggest that distinct features of sleep microarchitecture relate to next-day decision making. Greater NREM sigma activity appears to buffer against risky choices, whereas REM sleep supports overall performance. Sleep quality may be a critical contributor to cognitive and behavioral functioning during adolescence and early adulthood.

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0244

VALIDATION OF SPECTRAL SCORING WITH POLYSOMNOGRAPHY IN PEDIATRIC SLEEP

Alessandra Shuster¹, Julie Onton², Estella Knobbe¹, Kalysa Bui¹, Lia Galut³, Neal Nakra³, Katharine Simon¹

¹University of California, Irvine, ²University of California, San Diego, ³Children's Hospital of Orange County

Introduction: Sleep scoring algorithms have advanced efficiency in evaluating sleep staging, however they have primarily been developed for adult populations. The present preliminary study seeks to evaluate whether a spectral scoring approach, previously validated in adults, is also valid in pediatric populations. While this approach was designed to capture dominant spectral patterns, rather than replicate specific visual stages, visual-spectral comparisons are essential to evaluate how these methods correspond.

Methods: Participants ($n = 22$, 9-13 years, 15F) completed overnight sleep studies monitored by polysomnography at the Children's Hospital of Orange County. Visual scoring was determined by registered polysomnographic technologists and confirmed by board certified sleep physicians following AASM guidelines. Spectral activity within each epoch was assessed for the following: Wake (40–95 Hz), Light (~11–15.5 Hz), Hi Deep (1–3 Hz), Lo Deep (0.1–1 Hz), and REM (~17–26 Hz). For each 30-sec epoch, the conditional probability of the participant being in each stage was calculated and the stage with maximal probability was assigned as the spectral score. Paired t-tests compared time spent in each stage for visual vs. spectral scores. Visually scored stage 2 (N2) was compared to spectral Light sleep. Visually scored slow wave sleep (SWS) was compared to spectral Lo Deep. Visually scored REM and total sleep time (TST) were compared to their spectrally scored equivalents.

Results: Overall, time in sleep stages was consistent between visual and spectral scoring, with high similarity for time spent in REM sleep, SWS, and TST (e.g. no significant differences, $p>.05$). However, participants spent less time in spectrally scored Light Sleep compared to visually scored N2 ($p=.04$, $t=-2.44$).

Conclusion: These results provide preliminary evidence that spectral scoring is a promising method for efficiently scoring

pediatric sleep. Ongoing analyses will further evaluate the discrepancy between visual Light Sleep and spectral N2. Given that this method assigns stages based on dominant spectral features within each epoch, this spectral approach provides additional, clinically relevant information that is not readily captured through traditional visual scoring. This may be particularly valuable for assessing sleep physiology in pediatric clinical populations, where developmental differences in EEG patterns may complicate visual scoring.

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0245

ASSOCIATIONS OF ACTIGRAPHIC SLEEP AND INSOMNIA SYMPTOMS WITH HEALTH AND WELLBEING FROM ADOLESCENCE TO YOUNG ADULTHOOD

Gina Mathew¹, David Reichenberger², Adwoa Dadzie³, Lindsay Master³, Anne-Marie Chang³, Orfeu Buxton³, Lauren Hale¹

¹Stony Brook Medicine, ²Oregon Health & Science University, ³Penn State University

Introduction: Few studies have examined long-term associations between adolescent sleep and young adult health, especially using objective sleep measures. We examined cross-sectional and longitudinal associations between measures of actigraphic sleep and insomnia symptoms with health and wellbeing from adolescence to young adulthood.

Methods: Data were from the Future of Families and Child Wellbeing Study (actigraphy n=295; insomnia n=2011; 53%F), a diverse, longitudinal birth cohort. Youth wore wrist-actigraphy at ages 15 (M±SD=6.7±2.0 nights) and 22 (11.5±3.5 nights) and self-reported insomnia symptoms, overnight hospital stays in the prior year, general health, and life satisfaction. Logistic regression models (with adjusted p-values per the false discovery rate [FDR]) assessed whether ages 15 and 22 actigraphic sleep measures (mean and variability [SD] of timing, duration, and sleep maintenance efficiency [SMEff], social jetlag), and self-reported difficulty falling (≥2 nights/week) and staying (≥1 night/week) asleep predicted age 22 health and wellbeing, adjusting for sociodemographic characteristics and self-reported health and wellbeing at age 15.

Results: Greater variability in sleep onset (OR=1.95, pFDR=.038), more social jetlag (OR=2.46, pFDR=.038), and difficulty falling asleep (OR=1.66, pFDR=.006) at age 15 predicted higher odds of staying overnight in the hospital in the past 12 months at age 22. Later sleep offset at age 15 predicted worse general health at age 22 (OR=0.83, pFDR=.041). Lower SMEff (OR=1.10, pFDR=.043), greater variability in sleep timing (OR=0.65-0.71, pFDR=.009) and in TST (OR=0.40, pFDR<.001), and self-reported difficulty falling asleep (OR=0.47, pFDR<.001) were cross-sectionally associated with lower odds of better general health at age 22. Difficulty falling asleep was also cross-sectionally associated with lower odds of positive life satisfaction at age 22 (OR=0.38, pFDR<.001).

Conclusion: Poorer actigraphic sleep health and insomnia symptoms during adolescence predicted higher likelihood of an

overnight hospital stay during young adulthood, even after adjustment for hospital stays at age 15 and sleep health at age 22. Cross-sectionally, young adults who had poorer actigraphic sleep health and difficulty falling asleep reported lower life satisfaction and worse general health at age 22. Improving youth sleep regularity and insomnia symptoms may protect young adult health, wellbeing, and overall quality of life.

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0246

HOLD ME CLOSE: EARLY CHILDHOOD BEDTIME ROUTINES AND ADOLESCENT ACTIGRAPHIC SLEEP

Olivia Martín-Piñón¹, Adrienne Duke-Marks², Cynthia Frosch², Ben Hinnant², Brian Gillis², Jennifer Somers², Lauren Hale³, Anne-Marie Chang⁴

¹Arizona State University, ²Auburn University, ³Stony Brook Medicine, ⁴Penn State University

Introduction: Bedtime routines, especially those that include physical contact and reading, are a highly effective strategy for supporting children's sleep from infancy to middle childhood. However, there is limited evidence that bedtime routines predict better sleep into adolescence and young adulthood, when significant biological and social changes result in shorter and more variable sleep.

Methods: The analytic sample was 484 youth (50% boys, 43.8% Black, 24.4% Hispanic/Latino, 20% White, 7.6% Other/Mixed race) and their mothers from the Future of Families and Child Wellbeing Study. A subsample of 253 young adults was used to assess sleep at age 22. Bedtime communication (e.g., reading, singing) and physical contact (e.g., cuddling/rubbing the child's back, comfort object) were measured with a "Yes/No" checklist when children were three years old. Objective sleep was assessed when youth were 15 and 22 years old with actigraphy. Eight sleep variables were derived: time in bed, minutes, efficiency, wake after sleep onset (WASO), and variability in parameters. All models accounted for mother-reported sleep hours at age 9, child sex-assigned-at-birth, race, and income:needs. Models assessing sleep variability accounted for average sleep, and models with age-22 sleep accounted for age-15 sleep.

Results: Multiple regression analyses in STATA 18 showed that communication activities at age three were associated with less variability in time in bed (-9.56, p = .04) and variability in sleep minutes (-8.76, p = .035) at age 15. Physical contact activities at age three were associated with higher average sleep efficiency (.71, p = .015) and lower average WASO, at age 15 (-3.17, p = .038). Associations were not detected at age 22.

Conclusion: Activities within a bedtime routine appear to serve different functions. Communication activities may support healthy sleep schedules, and physical contact activities may support sleep quality into adolescence. As youth move into young adulthood, increased independence, work and school stress may have stronger effects on sleep than early childhood bedtime routines. Psychoeducation on the multiple ways to engage in physical

contact (e.g., back rub, comfort object) and communication (e.g., reading, music) may help parents personalize bedtime routines to their own and their child's needs and preferences.

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0247

HOW DO TYPES OF DIGITAL CONTENT AND MOTIVES FOR NIGHTTIME DEVICE USE RELATE TO SLEEP AND MENTAL HEALTH AMONG ADOLESCENTS?

Chisa Hasegawa¹, Kazuhiko Fukuda²

¹Department of Physical and Health Education, Graduate School of Education, University of Tokyo, Tokyo, Japan, ²Sleep Research Institute, Edogawa University, Chiba, Japan

Introduction: Nighttime device use is associated with sleep problems. Studies have focused on the quantitative aspects of device use (e.g., duration, frequency) but not the qualitative aspects. This study examined how nighttime device use among adolescents relates to sleep and mental health, focusing on the following qualitative aspects: (A) digital content types and (B) motives for use.

Methods: Participants (n=831, aged 12–18 years) reported their sleep habits, frequency of smartphone use in bed, pre-bedtime activities (e.g., videos, gaming), and answered the Pediatric Daytime Sleepiness Scale (PDSS) and the Generalized Anxiety Disorder-7 (GAD-7). Participants who used smartphones in bed reported six use motives (e.g., habitual use, distraction) and duration of use. Hierarchical cluster analyses were based on (A) pre-bedtime activities and (B) motives for smartphone use in bed. Associations between activity-based clusters and sleep habits, PDSS, and GAD-7 were examined using ANCOVA adjusted for gender. Associations between motive-based clusters and the same outcomes were analyzed using multivariable logistic regression adjusted for grade, gender, and duration of smartphone use in bed.

Results: (A) Based on pre-bedtime activity responses (n=831), five clusters were identified: Cluster 1, “passive media users” (n=287); Cluster 2, “studying & passive media users” (n=88); Cluster 3, “heavy social networking services (SNS) users” (n=61); Cluster 4, “heavy gaming users” (n=84); and Cluster 5, “lower device users” (n=311). “Lower device users” showed advanced sleep–wake phase and longer weekday sleep duration than the other clusters. “Studying & passive media users” and “heavy SNS users” showed stronger sleepiness and anxiety. (B) Based on smartphone-use motive responses (n=506), four clusters were identified: Cluster A, “diverse users” (n=152); Cluster B, “diverse users excluding distraction” (n=139); Cluster C, “habitual users” (n=127); Cluster D, “purposeful users” (n=88). Compared with “purposeful users,” social jetlag was more likely among “diverse users” (aOR=2.35*), “diverse users excluding distraction” (aOR=2.27*), and “habitual users” (aOR=2.99**). Furthermore, “diverse users” had higher odds for sleepiness (aOR=2.54**) and anxiety (aOR=3.25***).

Conclusion: This study showed differences in digital content and motives for smartphone use to be associated with sleep habits, daytime sleepiness, and anxiety. These findings highlight the need to consider both quantitative and qualitative aspects of device use.

Support (if any):

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0248

DEVELOPMENTAL DIFFERENCES IN THE LINK BETWEEN SLEEP VARIABILITY AND EMOTION REGULATION DURING THE PRESCHOOL YEARS

Brianna Trudeau, Angela Staples, Jamie Lawler

Eastern Michigan University

Introduction: Sleep plays a central role in supporting emotion regulation (ER) during early childhood (Godzik et al., 2024). Sleep variability – the night-to-night fluctuation in when children go to sleep, how long they sleep, and when they wake – is emerging as a meaningful marker of risk (Hoyniak et al., 2020). A study of school-aged children found that sleep duration and quality were unrelated to self-regulation, but greater variability in sleep onset timing predicted poorer ER and higher impulsivity (Dadzie et al., 2025). Notably, these associations emerged only for certain subgroups, suggesting that the influence of sleep variability may depend on developmental or contextual factors. These associations, however, remain largely unexplored in preschoolers, a period characterized by significant variability in both sleep patterns and emerging ER skills. The present study examined whether night-to-night sleep variability predicts preschoolers' adaptive and maladaptive ER and whether these associations differ by age.

Methods: Participants (N = 59) were children aged 3–5 years from a larger study of self-regulation. Sleep variability (average standard deviation of bedtime, time in bed, and total time asleep) was assessed using actigraphy and caregiver-reported sleep diaries. Children's ER was measured using the Early Emotion Regulation Behavior Questionnaire (EERBQ). Linear regression models tested whether sleep variability separately predicted adaptive and maladaptive ER and whether these associations were moderated by child age. Gender was included as a covariate.

Results: Results revealed a significant interaction between child age and sleep variability in predicting adaptive ER ($\beta = 0.34$, $p = .04$). Among younger children, greater variability was associated with lower adaptive ER, whereas among older children, greater variability predicted higher adaptive ER. No significant effects emerged for maladaptive ER strategies.

Conclusion: These findings suggest that sleep variability may affect emotion regulation differently across early childhood. Younger children may struggle to engage in still-developing adaptive ER skills when sleep is irregular, whereas five-year-olds, whose ER abilities are more developed, may be better able to draw on adaptive strategies to cope with poor sleep. Future research should clarify the developmental mechanisms that underlie these age differences and continue to identify which children are most sensitive to sleep variability.

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0249

EARLY DIFFERENCES IN SOCIAL JETLAG ACROSS RACIAL AND ETHNIC GROUPS IN U.S. CHILDREN

Lauren Hartstein¹, Michael Grandner², Olivia Gerber³, Zoe Meredith³, John Harsh³

¹University of Arizona College of Medicine Tucson, ²University of Arizona, ³University of Colorado Boulder

Introduction: Growing evidence highlights the importance of maintaining regular sleep timing, beyond sufficient sleep duration, for numerous sleep and health outcomes. Social jetlag (SJL), a measure of sleep irregularity and a proxy for circadian misalignment, has been observed in children as young as 2 years, increasing across development. Although racial/ethnic differences in children's sleep duration and quality are well established, no studies to date have examined differences in SJL.

Methods: Data were analyzed across 5,348 children ages 2-11 years (52.7% Non-Hispanic White, 9.0% Asian, 20.6% Hispanic/Latino, 17.6% Black/African-American, 49.7% female) collected from 2018-2022 as part of the NIH Environmental Influence on Child Health Outcome (ECHO) study. Sleep timing and racial/ethnic identity were collected via parent-report through completion of the ECHO Child Sleep Health Questionnaire and the ECHO Demographic of the Biological Family survey. SJL was calculated as the difference between weekday and weekend midsleep times. Weekend midsleep times were adjusted to account for sleep extension due to accumulated weekday sleep loss.

Results: Between subjects ANOVA revealed significant main effects of age and race/ethnicity, and a significant age x race/ethnicity interaction (all $p < 0.001$). SJL was significantly greater overall for Hispanic/Latino and Black/African-American children relative to Non-Hispanic White and Asian children and increased in magnitude with age across all groups. Small racial/ethnic differences in SJL were observed in children ages 2-4, growing significantly with advancing age. Substantial racial/ethnic differences in sleep timing were already present at age 2, with weekday and weekend midsleep times for Non-Hispanic White children occurring 40 and 55 min earlier than Black/African-American children and 58 and 73 min earlier than Hispanic/Latino children.

Conclusion: Racial/ethnic differences in parent-reported SJL emerged as early as age 2, increasing with the transition to formal schooling and the need to adhere to fixed start times. Given the expanding recognition of sleep regularity as a key factor in healthy development, these findings point to a potential early contributor to group differences in sleep health and underscore the need to identify factors driving these differences. Such work is critical for informing interventions and policies that support healthy sleep for all children.

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0250

HOW PARENTAL STRESS, ANXIETY, AND STYLE FACILITATE CHILD SLEEP THROUGH PARENT-CHILD SLEEP INTERACTIONS

Sophie Lance¹, Lauren Maryea¹, Lindsey Mooney², Tracy Riggins³, Rebecca Spencer¹

¹University of Massachusetts, Amherst, ²University of California, Davis, ³University of Maryland

Introduction: Promoting sleep quality in early childhood is important and may be affected by caregiver factors such as parenting style and psychopathology. While these factors may have a direct impact, they may also influence child sleep via bedtime

interactions. Parenting stress and parental anxiety can negatively interfere with parent-child interactions. Different parenting styles may relate to more permissive or restrictive bedtime routines and ability to foster a supportive sleep environment. We hypothesized that parent-child sleep interactions would mediate the relation between caregiver factors, specifically parental stress, anxiety, and style, and children's average sleep duration.

Methods: Primary caregivers of preschool-aged children (N=91, Mage=3.75 years, SDage=0.532, Rangeage=3.01-5.23, 52% female) completed the Parenting Styles and Dimensions Short Form Questionnaire, Parenting Stress Index, PROMIS Anxiety Scale, Parent-Child Sleep Interactions Scale, and reported their child's typical overnight sleep duration.

Results: To investigate how caregiver factors affect sleep duration, a mediation analysis was performed. The predictor variable for the analysis was stress, anxiety, or parenting style. The mediator variable was parent-child sleep interactions. The outcome variable was average sleep duration. Path estimates showed significant relations between sleep interactions and parenting stress ($\beta=.113$, $p=.011$), permissive style ($\beta=.946$, $p<.001$), and parent anxiety ($\beta=.226$, $p<.001$). The effect of sleep interactions on sleep duration was significant for parenting stress ($\beta=-.027$, $p=.003$), permissive style ($\beta=-.026$, $p=.004$), and anxiety ($\beta=-.03$, $p<.001$). Parenting stress ($\beta=-.005$, $p=.192$), permissive style ($\beta=-.026$, $p=.301$), and parent anxiety ($\beta=.003$, $p=.549$) did not significantly relate to sleep duration.

Conclusion: Caregiving factors did not have a direct effect on child sleep duration, but were associated with sleep interactions. Sleep interactions were related to sleep duration. These findings suggest that the primary mechanism through which caregiver factors influence child sleep is via sleep interactions. Among caregiving factors, a permissive caregiving style exerted the strongest effect on sleep interactions. Education regarding specific interventions to foster healthy bedtime interactions may be beneficial in supporting children's sleep quality.

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0251

HOW DO NONLINEAR AGE TRAJECTORIES OF SLEEP DIFFER BETWEEN YOUTH AT FAMILIAL RISK FOR MOOD DISORDERS AND LOW-RISK YOUTH?

Zachary Hubshman¹, Anna Nazarova¹, Mayank Ramchandani², Jason d'Eon², Nitya Adepalli², Kathryn Freeman¹, Max Wang², Rudolf Uher¹

¹Dalhousie University, ²Nova Scotia Health

Introduction: Familial risk for mood disorders is associated with early vulnerability, with sleep dysregulation emerging as a key feature that often precedes clinical onset. However, few studies have assessed sleep in high-risk youth using objective methods, and it remains unknown whether objectively measured sleep develops differently across age in this population. Because sleep changes dynamically rather than linearly across childhood and adolescence, models that allow for nonlinear developmental trajectories may be particularly well-suited to detect emerging group

differences. We hypothesized that high-risk youth would exhibit more extreme sleep duration, later sleep midpoint timing, and poorer sleep regularity in late adolescence and young adulthood.

Methods: A total of 177 youth at familial risk for mood disorders (mean age = 14.9 years) and 113 control youth (mean age = 13.8 years) wore wrist actigraphs continuously for two weeks. Sleep duration, sleep midpoint timing, and sleep regularity were derived from the actigraphy data. Generalized additive mixed models were used to estimate age-related trajectories and to allow non-linear relationships between age and each sleep parameter. Model fit was evaluated by comparing linear and nonlinear models using Akaike and Bayesian information criteria.

Results: All nonlinear models demonstrated superior fit relative to linear models based on AIC and BIC. High-risk youth showed a significantly different development trajectory in total sleep time ($F = 5.5$, $p_{BH} = 0.009$), with greater sleep duration from 18-22 years. Sleep midpoint significantly differed by risk status ($F = 2.4$, $p_{BH} = 0.028$), such that high-risk youth slept later from 11-14 years and earlier from 16-19 years. Sleep regularity significantly differed by risk status ($F = 7.0$, $p_{BH} < 0.001$), with high-risk youth sleeping more irregularly from 12-15 years and more regularly from 17-22 years.

Conclusion: High-risk youth exhibited poorer sleep than controls around puberty but, contrary to expectations, better sleep by late adolescence. This developmental reversal may reflect pubertal-related disruptions in sleep regulation and shifting sleep priorities in young adulthood. These findings underscore the importance of age-by-family-risk interactions and closer examination of late-adolescent sleep in high-risk youth.

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0252

LIGHT EXPOSURE PATTERNS AND SLEEP/CIRCADIAN TIMING IN PRESCHOOL-AGED CHILDREN

Benjamin Grandner¹, Lauren Hartstein²

¹Catalina Foothills High School, ²University of Arizona College of Medicine Tucson

Introduction: Young children (for whom earlier bedtimes are developmentally appropriate) are increasingly exposed to less bright, natural light during the day, and more artificial light at night. This can impact their sleep and overall health. Although it is known that nighttime light exposure can influence sleep and circadian timing in this age group, little is known about the impacts of daytime light exposure patterns.

Methods: Data were collected from 49 healthy, good-sleeping children aged 3.3 to 6.0 years (55.1% female). Children adhered to a consistent parent-selected sleep schedule for 7 days. They then completed an in-home dim-light melatonin onset (DLMO) assessment. Light exposure (lux) and sleep timing were assessed via wrist-worn actigraphy.

Results: Later mean timing of exposure to light greater than 10, 100, and 1000 lux were associated with later DLMO, bedtime, sleep onset, and sleep offset (all $p \leq 0.001$). However, when controlling for bedtime, the relationship between mean light timing and circadian phase was no longer significant. Longer exposure to bright light (> 1000 lux) was associated with earlier bedtime ($p = 0.01$), sleep onset ($p = 0.03$), and sleep offset ($p = 0.008$). Greater light exposure 120- and 60-min before bedtime was also associated with earlier bedtime, sleep onset, and sleep offset. However,

exposure to brighter light levels throughout the day ($p = 0.02$), in the afternoon from 12:00 to 18:00 ($p = 0.005$), and 180-min before bedtime ($p = 0.006$), as well as longer exposure to light levels over 100 lux ($p = 0.03$) and 1000 lux ($p = 0.02$), were all associated with worse sleep efficiency.

Conclusion: Later average light exposure was associated with later DLMO and sleep timing, largely because of later bedtimes. However, children who went to bed early often had more light exposure 1-2 hours before bedtime, likely because they are going to bed shortly after sunset. Light exposure patterns also impacted sleep quality. These data suggest that age-appropriate earlier bedtimes in preschoolers may require different recommendations about light exposure before bed than older age groups. Future studies can look at the timing of light exposure as a strategy for improving early sleep health in the context of developmentally early sleep schedules.

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0253

LINKS BETWEEN SOCIAL JETLAG AND INTERNALIZING SYMPTOMS IN CHILDHOOD

Olivia Gerber¹, Zoe Meredith¹, Leen Abbas², Lauren Hartstein³, Michael Grandner⁴, John Harsh¹

¹University of Colorado Boulder, ²University of California San Diego School of Medicine, ³University of Arizona College of Medicine Tucson, ⁴University of Arizona

Introduction: Social jetlag (SJL), defined as the discrepancy between weekday and weekend midsleep timing, is associated with depressive and anxiety symptoms in adults and adolescents. However, this association has not been studied in childhood. Here, we examined the relationship between SJL and depression and anxiety symptoms in children. We hypothesized that symptoms of depression and anxiety would increase with greater SJL magnitude.

Methods: Data were analyzed for children 2.0-11.9 years ($M = 5.76 \pm 3.38$ years, 48.7% females) from the NIH Environmental Influence on Child Health Outcome (ECHO) study collected between 2018-2021. Caregivers completed the ECHO Child Sleep Health Questionnaire, the ECHO PROMIS Depression 8a Questionnaire, the ECHO PROMIS Anxiety 8a Questionnaire, and demographic questionnaires. Depression data were available for 2230 children and anxiety data were available for 650 children. SJL was calculated as the weekend-weekday difference in nocturnal midsleep timing, with weekend midsleep corrected for sleep extension due to a weekday sleep debt.

Results: Logistic regression was used to examine the association between social jetlag (< 30 min, 31-60 min, and > 60 min) and the presence of mild or greater depressive symptoms. Mild or greater depressive symptoms increased across SJL categories (≤ 30 min: 20%; 31-60 min: 23%; > 60 min: 29%). After adjusting for covariates, children with SJL > 60 minutes had higher odds of mild or greater depressive symptoms relative to children with SJL ≤ 30 minutes, (OR = 1.719; $p < .001$, 95% CI [1.303, 2.389]). SJL was not associated with mild or greater anxiety symptoms.

Conclusion: Across early and middle childhood, greater SJL was related to increased reports of depressive symptoms, consistent with findings in adults and adolescents. These results suggest that SJL may represent a risk factor for depression in childhood. Targeted interventions to regulate sleep-wake timing in young

children, particularly those with a predisposition for depression or later sleep timing, may help to reduce risk.

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0254

LONGITUDINAL PATTERNS OF CIRCADIAN PHASE AND SLEEP TIMING ACROSS EARLY CHILDHOOD

Lauren Hartstein¹, John Harsh², Monique LeBourgeois²

¹University of Arizona College of Medicine Tucson, ²University of Colorado Boulder

Introduction: Early childhood represents a period of profound developmental changes in brain maturation and sleep consolidation. However, little is known about the developmental trajectory of the circadian system and its relationship with sleep timing during this period. Longitudinal data on circadian phase across childhood are rare, limiting our understanding of individual differences and stability throughout development. Describing these patterns is essential to identify factors contributing to behavioral sleep problems. We examined longitudinal changes in circadian phase and its relationship with sleep timing across early childhood.

Methods: Data were collected from healthy children between 2007 and 2016. Circadian phase and sleep timing were assessed across four ages: 2-3 years (T1, N=58), 3-4 years (T2, N=49), 4-5 years (T3, N=32), and 5-6 years (T4, N=35). Children maintained their habitual sleep schedule for 5 days, confirmed via actigraphy. They then completed an in-home assessment of their dim light melatonin onset (DLMO). Linear mixed-effects models tested whether DLMO, sleep timing (bedtime, sleep onset, midsleep time, sleep offset), or phase angles of entrainment varied across timepoints.

Results: Average DLMO was 19:30 ± 0:47 at T1, 19:30 ± 0:59 at T2, 19:16 ± 1:06 at T3, and 19:21 ± 1:10 at T4. DLMO preceded bedtime by an average of 36 ± 47 min at T1, 43 ± 60 min at T2, 52 ± 63 min at T3, and 36 ± 48 min at T4. There were no significant effects of timepoint on DLMO, sleep timing, or phase angles. Across all timepoints, children with later DLMOs had significantly later sleep onsets and midsleep times. Later DLMOs were associated with significantly later bedtimes at T1 ($r=0.43$), T2 ($r=0.30$), and T3 ($r=0.45$), but not at T4 ($r=0.27$).

Conclusion: Both circadian phase and its relationship with sleep timing appear remarkably stable across ages 2-6 years, even as children drop daytime naps and begin formal schooling. These foundational data on early circadian physiology can help guide the development of targeted interventions for children with behavioral sleep problems, supporting better alignment between circadian rhythms and sleep timing.

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0255

LONGITUDINAL TRAJECTORIES OF INFANT CIRCADIAN REST-ACTIVITY PATTERNS AND THEIR ASSOCIATION WITH NEURODEVELOPMENT AT 12 MONTHS: THE SNUGGLE BUG STUDY

Megan Petrov, Li Liu, Corrie Whisner

Arizona State University

Introduction: Infant sleep-wake development is associated with neurodevelopmental outcomes, yet prior literature shows mixed findings that vary by age of assessment, measurement modality, number of follow-up periods, and neurodevelopmental domain. Most studies also rely on parent-reported infant sleep, limiting precision. This secondary analysis examined actigraphy-assessed circadian rest-activity (CRA) trajectories across infancy and their associations with neurodevelopmental domains at 12 months.

Methods: In this longitudinal, observational cohort (Snuggle Bug | Acurruadito), singleton, full-term infants (≥37 weeks) born of normal weight were recruited from the Phoenix, AZ community. At six timepoints (3 and 8 weeks; 3, 6, 9, and 12 months), infants wore an ankle actigraph (Micro Motionlogger, Ambulatory Monitoring, Inc.) for five consecutive 24-hr periods. Minute-level data were used to derive CRA metrics: relative amplitude (RA) and interdaily stability (IS). At 12 months, mothers completed the Ages and Stages Questionnaire-3 (ASQ-3), yielding scores in infant communication, gross motor, fine motor, problem-solving, and personal-social domains, categorized using age-normative cutpoints. Latent growth curve analysis (LGCA) identified CRA trajectory classes and tested associations between CRA class membership and ASQ categories, adjusting for confounders showing significant univariate associations with ASQ categories (infant sex, gestational age, maternal education and age, breastfeeding duration).

Results: One hundred eighteen infants (58% female) contributed CRA and ASQ-3 data. Both RA and IS increased significantly over time in nonlinear trajectories, with the largest increases from 3 weeks to 3 months for IS and from 3 weeks to 6 months for RA. LGCA identified two latent IS classes and no classes for RA. Infants in IS latent class 2 demonstrated consistently higher IS values across infancy. Compared with class 1, class 2 membership was associated with non-normative gross motor scores; however, this association was attenuated after adjustment for gestational age (Estimate: 0.21 [SE=0.11], $t=1.87$, $p=0.06$). No associations were observed between IS and RA and other ASQ-3 domains.

Conclusion: CRA trajectories across the first year of life were not significantly associated with neurodevelopmental outcomes at age 1 year. The next immediate steps include evaluating additional CRA metrics, multidimensional sleep health, and longer-term developmental outcomes.

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0256

MATERNAL CLOSENESS AND SLEEP HEALTH FROM ADOLESCENCE TO YOUNG ADULTHOOD

John Mitchener¹, Adwoa Dadzie¹, Christa-Maria Ngam¹, Lindsay Master¹, Gina Mathew², Orfeu Buxton¹, Lauren Hale², Anne-Marie Chang¹

¹Pennsylvania State University, ²Stony Brook Medicine

Introduction: Youth with closer relationships with their mothers have better sleep health. Limited research examines longitudinal associations between closeness with one's mother and sleep health from adolescence into young adulthood. We investigated cross-sectional associations between maternal closeness and sleep health and longitudinal associations from age 15 to 22.

Methods: Methods: Adolescents ($n=3241$; $M\text{ age}=15.6$) and young adults ($n=1048$; $M\text{ age}=22.2$) from two waves of the Future of Families and Child Wellbeing and sleep sub-study self-reported maternal closeness on a scale of 1-4 (low to high). Sleep estimates were collected at both waves including actigraphic ($M15y=6$; $M22y=10.7$ days) and self-reported sleep timing and duration, actigraphic wake after sleep onset and sleep maintenance efficiency (SMEff), and self-reported difficulty falling and staying asleep (#nights/week). Separate linear regression models assessed cross-sectional associations of maternal closeness with sleep health at ages 15 and 22, while adjusting for sociodemographic covariates and depressive symptoms collected at each wave. Longitudinal associations between age 15 maternal closeness and age 22 sleep health were assessed using linear regression adjusting for age 22 sociodemographic and depressive symptoms.

Results: Results: In adolescence, greater closeness with one's mother was associated with longer sleep duration ($b=0.18h$; 95% CI:[0.13,0.23]), earlier bedtime ($b=-0.16h$; 95% CI:[-0.21,-0.11]), and fewer nights with difficulty falling asleep ($b=-0.23$; 95% CI:[-0.31,-0.15]; $n=3241$) according to self-report. Greater maternal closeness during adolescence was also associated with lower actigraphic SMEff ($b=-0.28\%$; 95% CI:[-0.53,-0.03]; $n=883$). Among young adults, greater closeness with one's mother was associated with fewer nights of self-reported difficulty falling asleep ($b=-0.21$; 95% CI:[-0.37,-0.05; $n=830$]), yet higher actigraphic SMEff ($b=0.39\%$; 95% CI:[0.07,0.72]; $n=467$) in fully adjusted models. Longitudinally, greater maternal closeness in adolescence predicted fewer nights with self-reported difficulty falling asleep in young adulthood ($b=-0.25$; 95% CI:[-0.44,-0.06; $n=820$). No other significant associations between maternal closeness and sleep were identified in cross-sectional or longitudinal analyses.

Conclusion: Conclusions: Findings suggest stronger emotional attachment with one's mother in adolescence may be protective of sleep health into adulthood. Future studies should consider interventions aiming to strengthen or maintain the relationship between mother and child as a mechanism to potentially improve sleep health.

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0257

PARENTAL AND ADOLESCENT SLEEP CONSCIOUSNESS AND ASSOCIATIONS WITH TEEN SLEEP HEALTH

Giovanni Alvarado, Cara Palmer
Montana State University

Introduction: Overall health consciousness, or having an active interest in one's health, has been linked to healthier habits such as diet and exercise. Understanding of sleep health consciousness, or the extent to which individuals are attentive and aware of their sleep and sleep health behaviors, is not well understood. The current study developed a measure of adolescent sleep health consciousness and caregiver sleep health consciousness, and examined associations with teen sleep health behaviors. This study expands on a small but emerging area of research suggesting that the way teens and their parents think about sleep may be important for adolescents' sleep health (Alvarado et al., 2024).

Methods: The sample included 125 adolescents ages 10-17 years and their caregivers. Adolescents completed questionnaires to assess sleep duration, sleep hygiene, regularity, disturbance, satisfaction, weekday and weekend bedtime, as well as a newly developed 9-item Sleep Health Consciousness Scale for youth ($\alpha = .80$; e.g., "I am very aware of how much sleep I get."). Caregivers completed sociodemographics and a similar 9-item parent-reported Child Sleep Health Consciousness Scale ($\alpha = .88$), which included items to assess their awareness of their child's sleep.

Results: Exploratory factor analyses indicated that a one factor solution was the best fit for both the child and parent-reported scales. Regression analyses showed that child age moderated the association between child sleep consciousness and sleep duration ($b = .08$, $SE = .03$, $p = .008$). Higher child sleep consciousness was associated with longer sleep duration among older children ($b = .30$, $SE = .1$, $p = .003$), but not among younger children. Parent sleep consciousness predicted earlier weekday bedtimes ($b = -.48$, $SE = .22$, $p = .03$), regardless of age.

Conclusion: Results suggest that caregivers sleep health consciousness, or their attentiveness and awareness of their children's sleep, was associated with earlier weekday bedtimes. Child sleep consciousness may also be an important indicator of sleep health, but primarily for older adolescents. These findings provide support for the importance of parents in supporting teen sleep health, and that it may be important to include parents in teen sleep interventions and when promoting teen sleep education.

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0258

POSTERIOR SPINDLE DENSITY MODERATES OVERNIGHT DISCRIMINATORY ATTENTION CHANGE IN CHILDREN

Ido Harber, Tamara Taporoski, Camilla Matthews, Emma Strainis, Ana Maria Vascan, Stephanie Jones
University of Wisconsin-Madison

Introduction: Sleep spindles have been implicated in the stabilization of cognitive performance across sleep, yet their functional relevance in childhood remains poorly characterized. Because spindle topography and frequency undergo marked developmental changes - with slow spindles most prominent over posterior regions in early and middle childhood - region-specific spindle dynamics may be especially important for attention during this period. This study examined whether anterior (fast) versus posterior (slow) spindle density predicts overnight changes in attentional performance in children.

Methods: Forty-eight healthy children (ages 5-11) completed the Test of Variables of Attention (TOVA) in the evening (PM) and morning (AM) surrounding an overnight high-density EEG recording (256 channels). The primary outcome was TOVA d-prime from the first quarter, indexing discriminatory attention. Spindle density was quantified separately for anterior and posterior regions. Generalized Estimating Equations (GEE) tested the interaction between timepoints of TOVA performance (AM vs PM) and spindle density, controlling for age and gender.

Results: Overall, there was no significant change in absolute TOVA scores from PM to AM ($\beta = -0.47$, $p = 0.20$). However, children with higher posterior spindle density showed a more favorable

overnight stabilization of attentional performance, reflected in a significant Time $\times$ Posterior Spindle interaction ($\beta = 0.04$, $p = 0.04$). Anterior spindle density did not moderate overnight change ($\beta = 0.01$, $p = 0.20$). As expected, older children showed significantly higher d-prime scores across timepoints ($\beta \approx 0.48$, $p < .01$), while gender had no effect in either.

Conclusion: Posterior spindle density predicts the extent to which attentional discrimination is preserved across sleep in school-aged children. This regional specificity aligns with developmental neurophysiology: slow spindles are maximal over posterior cortex in childhood and may support stabilization of attention-related networks. These findings highlight the importance of region-specific sleep physiology in developmental attentional processes and motivate finer-grained analyses using spindle subtypes and additional TOVA metrics. Future research could clarify whether posterior spindle activity serves as a potential risk indicator for attentional difficulties in children.

Support (if any):

Abstract citation ID: **zsag091.0259**

0259

THE ROLE OF SLEEP WITHIN THE 24-HOUR ACTIVITY CYCLE IN EXECUTIVE FUNCTIONING ACROSS CHILDHOOD AND YOUNG ADULTHOOD ADHD

Michelle Lim, Janis Gaudreau, Abbie Levinson, Alex Seng, Haley Forbes, Daniel Flores, Alisa Baron, Vanessa Harwood, Nicole Logan
University of Rhode Island

Introduction: Attention-Deficit/Hyperactivity Disorder (ADHD), marked by executive dysfunction, is often diagnosed in childhood and persists into adulthood. Components of the 24-hour activity cycle (24-HAC), including sleep, sedentary behavior (SB), and physical activity (PA), are modifiable factors that may improve executive function. However, little research has examined how these behaviors interact and which combinations benefit individuals with ADHD, despite this developmental stage being pivotal for healthy habit formation. This study examines associations between the 24-HAC and executive dysfunction in children and young adults with ADHD.

Methods: 46 children (10.65 ± 2.79 years) and 51 young adults (22.04 ± 2.95 years) with ADHD participated in a cross-sectional design. Assessments included demographics (age, sex, parent income) and body mass index (BMI). Awake behaviors were obtained via 7-day wrist-worn accelerometry and averaged for school-days and weekends (light PA [LPA], moderate-to-vigorous PA [MVPA], and SB). Sleep duration was self-reported using logs and the Pittsburgh Sleep Quality Index. Executive dysfunction was measured via the Behavior Rating Inventory of Executive Function, with parent-report for children (BRIEF-2) and self-report for young adults (BRIEF-A). Compositional Data Analysis predicted changes in executive dysfunction based on 60-minute reallocations between 24-HAC behaviors, using isometric log-ratio transformation and adjusting for age, sex, BMI, and parent income with 95% confidence intervals.

Results: In children, reallocating a total of 60 minutes from sleep to LPA and MVPA in proportion to relative balance during school-days reflected less dysfunction for emotional control ($\beta = -0.43$, $p = 0.04$). Additionally, decreasing 60 minutes of weekend sleep predicted less dysfunction in emotional control among children ($\beta = -0.65$, $p = 0.03$). In young adults, reallocating LPA and MVPA to sleep and SB during school-days was associated with less dysfunction of shifting regulation ($\beta = -0.43$, $p = 0.01$).

Conclusion: Reallocating time from sleep toward PA on both school-days and weekends may support emotional regulation for children with ADHD, while increasing sleep on school-days may benefit cognitive flexibility in young adults with ADHD. The present study reflects a shift toward restorative behaviors rather than SB time alone, highlighting the dynamic role of sleep and PA for supporting executive functioning across developmental stages in ADHD-related difficulties.

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0260

CHRONOTYPE IS NOT ASSOCIATED WITH 12-MONTH CHANGES IN BODY COMPOSITION OR ANTHROPOMETRICS IN BLACK EMERGING ADULTS: SHOW STUDY PRELIMINARY FINDINGS

Hannah Koch, Aubrey Kehoe, Laurie Wideman, Jessica McNeil
University of North Carolina at Greensboro

Introduction: Having a late type vs. early chronotype has been associated with a higher risk of weight gain and obesity. Black emerging adults (ages 18-28 years) have a greater risk of obesity, yet there is little research examining relationships between chronotype and long-term changes in body weight and body composition in this population. These analyses from the Sleep, Health Outcomes, and Body Weight (SHOW) Study examined preliminary associations between chronotype with 6- and 12-month changes in body composition and anthropometrics in a sample of Black emerging adults.

Methods: The SHOW study aims to recruit 150 Black emerging adults and assess changes in body weight and composition from baseline (BLN) to 6-months (6MO), and 12-months (12MO). Chronotype was measured at BLN with the Morningness-Eveningness Questionnaire (MEQ) and analyzed as a continuous variable (possible score, 16-86; higher scores indicate an earlier chronotype). Body composition (fat mass index and fat-free mass index (kg/m^2); DXA or Bod Pod) and anthropometrics (body weight, waist and hip circumferences) were measured during an in-laboratory visit at each timepoint. Partial Pearson correlations examined associations between chronotype with 6- and 12-month changes in body composition and anthropometrics, controlling for BLN body weight. Given the exploratory nature of these analyses, we investigated these associations in the entire sample and in males and females separately.

Results: To date, 6MO data are available in 68 participants (46 females; BLN: age, 20.3 ± 2.0 yrs; body mass index, 26.1 ± 6.2 kg/m^2 ; fat mass index, 7.7 ± 5.2 kg/m^2 ; fat-free mass index, 17.1 ± 3.0 kg/m^2 ; waist-to-hip ratio, 0.80 ± 0.07 cm; MEQ score, 47.1 ± 6.1), and 12MO data are available in 44 participants (31 females). In

the entire sample, MEQ score was not significantly associated with changes in body composition or anthropometric variables. In females, having an earlier chronotype (or higher MEQ score) was associated with a greater 12-month decrease in fat-free mass index ($r=-0.37$, $p=0.050$), but this trend was not observed in males ($r=0.31$, $p=0.32$).

Conclusion: These preliminary findings suggest that chronotype is not associated with changes in body weight and body composition in Black emerging adults, although it may impact changes in body composition differently between males and females.

Support (if any): NIH Grant R01HL163804

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0261

DISCOURSE AROUND SLEEP, PERFORMANCE, AND WORK IN THE U.S. PRINT MEDIA: 1983-2017

Joon Chung

University of Miami Miller School of Medicine

Introduction: This computational social science study examined trends in sleep discourse in major U.S. newspapers from 1983 to 2017. If societies undergo change over time, so too might sleep norms and expectations. The purpose of this report is to document and investigate the possible shifting significance of sleep over this time period.

Methods: Leveraging the large-scale digital archiving of newspapers from the 1980s, news articles from major U.S. newspapers were acquired from ProQuest (1983-2017). Articles were searched by the following criteria: "sleep" appeared in the title or abstract, from the New York Times, Washington Post, Chicago Tribune, USA Today, the Wall Street Journal, the Orange County Register, and Los Angeles Times. A 70-topic structural topic model was run on the corpus containing 25,766 documents.

Results: The data show tension between work and sleep but also show attempts at 'customization' which emphasizes the importance of protecting sleep for performance and productivity. Further, the link between poor sleep and adverse health outcomes is increasingly emphasized. Naps emerged as a significant concept for discussion in relation to work and night-time sleep.

Conclusion: An analysis of U.S. print media from 1983 to 2017 suggests attempts at 'customization', that is, towards the view of sleep as beneficial for performance and productivity. One rationale for customization may be that since cultural attitudes towards work are unlikely change, and work is of prime importance, sleep must be framed as complementary to work. America's relationship with sleep and work could be viewed as an evolving discussion on how to square the necessity of sleep for optimal performance with the fact that an hour more for sleep is an hour less for work or leisure.

Support (if any): Training and research: Emory University, Department of Sociology; Martin Levinson departmental grant to attend the Inter-university Consortium for Political and Social Research (ICPSR) summer course "Machine Learning for the Analysis of Text as Data" (2017). Writing: 5R01HL152453.

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0262

EMPIRICALLY-DERIVED SUBGROUPS IN SELF-REPORTED SLEEP OUTCOMES ACROSS THE MENSTRUAL CYCLE

Allison Stumper¹, Anisha Nagpal², Tory Eisenlohr-Moul², Jessica Peters³

¹E.P. Bradley Hospital, ²University of Illinois Chicago, ³Brown University

Introduction: While the extant research suggests objective sleep measures do not appear to vary across the menstrual cycle, there is mixed support for a modest decrease in self-reported sleep quality in the luteal phase. However, emerging evidence on hormone sensitivity suggests strong individual differences in how hormonal flux across the cycle impacts affect and behavior, giving rise to distinct temporal symptom patterns. This dimensional framework may explain prior mixed results or modest effect sizes. The current study examined potential subgroups of change in self-reported sleep outcomes across the menstrual cycle.

Methods: Methods: Participants were N=125 naturally-cycling females recruited for elevated borderline personality disorder symptoms to participate in an ongoing study examining ovarian steroid effects on mood outcomes across the cycle. Participants completed daily diaries every morning for 2 menstrual cycles which included questions asking about sleep the prior night (time to fall asleep, hours slept, number of awakenings, overall sleep quality). They also completed LH-surge tests to determine ovulation. Cycles were scaled using the menstrualcycleR package in R. Generalized Additive Mixed Models (GAMMs) were conducted to examine fluctuation in sleep outcomes across the scaled cycle in the full sample; Smoothing Mixture Models (SMMs) were conducted to test for empirically-derived subgroups.

Results: In full-sample GAMMs, only sleep duration varied significantly across the cycle (luteal peak), but substantial heterogeneity emerged in both baseline levels and deviations from the average trajectory across all outcomes. SMMs identified distinct subgroups for each outcome: four for time to fall asleep (modest post-ovulatory increase, perimenstrual peak, periovulatory peak, late-luteal peak); three for sleep quality (periovulatory, midluteal, perimenstrual peaks); and two each for sleep duration (modest perimenstrual increase, midluteal peak) and awakenings (perimenstrual, midluteal peaks). Subgroups differed on baseline levels, timing, severity of fluctuations, with most displaying significant nonlinear trends.

Conclusion: Results demonstrate distinct subgroups of patterns of change in sleep outcomes across the cycle, highlighting the importance of considering the cycle in clinical practice. Failure to examine these individual differences when modeling sleep across the cycle will potentially obscure effects. Future directions include applying these approaches to objective sleep measures.

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0263

IMPACTS OF ALAGILLE SYNDROME ON SLEEP OF PATIENTS AND THEIR CAREGIVERS

Amanda Mosini¹, Anna Kloster¹, Mariana Moyses-Oliveira², Monica Andersen³, Sergio Tufik¹

¹Universidade Federal de São Paulo, ²Sleep Institute, Associação Fundo de Incentivo à Pesquisa, ³Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Alagille syndrome (ALGS) is a rare multisystem genetic disorder characterized by cholestatic liver disease, severe pruritus, and various systemic abnormalities. Sleep disturbances are a significant aspect of the disease burden.

Methods: This study investigated sleep habits and disturbances in children with ALGS and their caregivers. The Children's Sleep Habits Questionnaire (CSHQ) and the Sleep Disturbance Scale for Children (SDSC) were administered to 13 children with ALGS and compared with age- and sex-matched controls (n=26), while the Pittsburgh Sleep Quality Index (PSQI) was applied to assess caregivers' sleep quality.

Results: A substantial proportion of children with ALGS have undergone surgical procedures (76.9%), of whom 30% required liver transplantation. In addition, 92.3% of patients receive pharmacological treatment, including immunosuppressive agents, cholestasis management, gastrointestinal drugs, cardiovascular/metabolic medications, vitamin supplements, or hormone therapy. Furthermore, 53.8% required antibiotic therapy more than once per year, and 15.5% received this treatment more than 3 times annually. A considerable number of children with ALGS exhibited functional limitations, with 76.9% reporting difficulty performing basic physical activities, such as running, jumping, or climbing stairs. Neurodivergences were observed in 23.1% of ALGS children. Children with ALGS showed substantial medical, functional, and sleep-related burdens. Total scores in the ALGS group on both questionnaires indicated broad sleep dysfunction, which was not influenced by transplantation status, medication type, or neurodivergence. Compared with controls, ALGS children demonstrated significantly higher CSHQ scores for sleep duration, night wakings, and parasomnias, as well as elevated SDSC scores for disorders of initiating and maintaining sleep and sleep-wake transition disorders. Correlation analyses revealed that several child sleep disturbances, including night wakings, daytime sleepiness, sleep-related anxiety, and disordered breathing, were associated with poorer caregiver sleep, underscoring interconnected sleep disruption within families.

Conclusion: This study shows that children with Alagille syndrome experience marked and multifactorial sleep disturbances that extend beyond cholestatic pruritus. Caregivers also demonstrated impaired sleep quality, highlighting the bidirectional impact of ALGS on family well-being. These findings underscore the need for integrated management strategies. Future work

should incorporate objective sleep measures, longitudinal assessment of pruritus and treatment responses to develop ALGS-specific sleep interventions.

Support (if any): AFIP, FAPESP, CNPq.

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0264

OBJECTIVE SLEEP HEALTH AND RAPID WEIGHT GAIN ACROSS THE FIRST TWO YEARS OF LIFE: LONGITUDINAL AUTOVIDEOSOMNOGRAPHY FINDINGS FROM A TWO-COHORT STUDY

Baram Kang¹, Sangchoon Jeon¹, Shambhavi Thakur², Natalie Barnett², Monica Ordway³

¹Yale University School of Nursing, ²Nanit, ³Yale University

Introduction: Rapid weight gain (RWG) in infancy is a strong predictor of later obesity, yet the contribution of objectively measured sleep health remains poorly understood. Most previous RWG-sleep studies rely on caregiver-reported sleep; only limited recent work incorporates actigraphy, and none use autovideosomnography to characterize multidimensional sleep health across the first two years of life. This study examined associations between sleep duration and other dimensions of objectively measured sleep health with RWG from birth to 24 months.

Methods: Infants were enrolled shortly after birth and completed sleep assessments at 6, 12, 18, and 24 months. In-home autovideosomnography estimated total sleep time (TST), sleep onset timing, wake after sleep onset (WASO), and nighttime awakenings. RWG was defined as >0.67 SD increase in weight-for-length/BMI z-score between visits. Analyses reflect the complete Cohort 1 dataset; Cohort 2 will broaden sample representation, with full dataset availability expected in January/February 2026.

Results: At the 6-month assessment, valid sleep data were available for 252 infants (44.3% female). Caregiver respondents were predominantly non-Hispanic White (67.5%), biological parents (86.0%), married (83.4%), and college educated (73.1%). RWG prevalence was 18.6%, 27.1%, 19.0%, and 6.9% for birth-6, 6-12, 12-18, and 18-24 months, respectively. No RWG-sleep associations were observed from birth to 6 months. At 12 months, infants with RWG (n=16) slept 37.35 minutes less per night than those without RWG (n=36) (t=2.94; p=.008). At 18 months, infants with RWG (n=2) slept 35.01 minutes longer per night than infants without RWG (n=22) (t=-3.30; p=.02). Sleep onset timing, WASO, and nighttime awakenings showed no significant associations with RWG at any age.

Conclusion: Cohort 1 findings suggest that shorter nocturnal sleep duration in late infancy may be associated with RWG, while other sleep dimensions did not differ by RWG status. The contrasting directionality observed at 18 months, based on a small RWG subgroup, may reflect developmental variability and warrants further investigation. The full two-cohort dataset available in

early 2026 will support deeper evaluation of early sleep-growth relationships and inform obesity prevention targets.

Support (if any): PRIME pilot funding, Yale School of Nursing

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0265

COMPREHENSIVE INVESTIGATION OF SLEEP ARCHITECTURE BY APOE GENOTYPE: APOE4 HOMOZYGOTES HAVE HIGHER AROUSAL THRESHOLDS

Gawon Cho¹, Anne Chen², Eunyong Choi³, Daniel Kay⁴, Orfeu Buxton⁵, Brienne Miner²

¹Yale University, ²Yale School of Medicine, ³University of Southern California, ⁴Brigham Young University, ⁵Penn State University

Introduction: APOE4, a genetic risk factor for Alzheimer's Disease (AD), is associated with reduced functional connectivity of brain regions that regulate sleep, predisposing persons to AD via altering sleep architecture. However, sleep architecture profiles associated with APOE4 genotype remain unknown.

Methods: This study examined the association between APOE genotype and sleep architecture among middle-aged and older adults, using in-home polysomnography (Sleep Heart Health Study, N=3,132). APOE genotype included: APOE4 heterozygotes, APOE4 homozygotes, APOE2 carriers (homozygotes and heterozygotes), and APOE3 homozygotes. Macro sleep architecture was quantified using the percentage of time spent in rapid eye movement sleep, N1, N2, N3, and arousal index. Micro sleep architecture was quantified as odds ratio product (ORP; a continuous measure of arousal likelihood) for overall sleep and each sleep stage, and spindle characteristics (power, density, and frequency). Linear regression was used, adjusting for covariates.

Results: Mean age was 67, 53% were female, 24% were APOE4 heterozygotes, and 2% were APOE4 homozygotes. Macro sleep architecture did not vary across genotypes. Compared with APOE3 homozygotes, APOE4 homozygotes exhibited fewer arousals with age ($\beta = -0.33$ per hour/year, $p = 0.04$), resulting in significantly fewer arousals at age 55+. ORP decreased in a dose-response pattern with the number of APOE4 alleles during overall sleep and across all sleep stages (ORPAPOE3/3=0.94, ORPAPOE3/4=0.91, ORPAPOE4/4=0.87). The difference in ORP widened with each year of age. Finally, there was a trend for lower spindle density and power in APOE4 homozygotes relative to APOE3 homozygotes ($p = 0.06$).

Conclusion: APOE4 carriers -particularly APOE4 homozygotes- exhibit elevated arousal thresholds and worse sleep microarchitecture compared to APOE3 homozygotes. Elevated arousal thresholds are reflected in the dose-response decline in ORP with each APOE4 allele and in the additional yearly decrease in ORP observed among carriers, consistent with age related declines in arousal index. Worse sleep microarchitecture is suggested by trends toward reduced sleep spindle activity among APOE4 homozygotes. Nonetheless, sleep macroarchitecture remained comparable across APOE genotypes. Taken together, reduced arousability in APOE4 carriers may reflect abnormalities in cortical activation leading to an arousal rather than a sign of healthier sleep.

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0266

HEALTHY SLEEP, SHARP MINDS: INVESTIGATING PSYCHOSOCIAL LINKS BETWEEN SLEEP HEALTH AND COGNITION IN LATER LIFE

Spencer Nielson¹, Natalie Dautovich¹, Joseph Dzierzewski²

¹Virginia Commonwealth University, ²National Sleep Foundation

Introduction: Despite the well-documented effects of poor sleep on well-being and cognition, particularly in later life, considerably less attention has been given to the role of sleep health in cognitive functioning. The mechanisms underlying the sleep health—cognition association, including psychosocial factors like depression, anxiety, and physical activity, remain poorly understood. This study examined associations between sleep health and cognitive functioning in later life and evaluated whether psychosocial factors mediated these associations.

Methods: Middle-aged and older adults participated in an online study (N=370, age range 55-78, Mage=62.8, 60.3% female). Participants completed various questionnaires measuring global sleep health (RUSATED), sleep regularity (Sleep Regularity Questionnaire; SRQ), subjective cognition (PROMIS-Cognitive Function), and psychosocial variables (depression, anxiety, loneliness, physical activity, sedentary behavior). After completing the survey, participants engaged in online cognitive testing to measure attention, memory, and executive function. Correlational analyses explored associations between variables while parallel mediation analyses with bootstrapped confidence intervals (CI) explored whether each sleep variable was indirectly associated with subjective and objective cognition, through psychosocial variables. Indirect effects with CIs that did not include zero were interpreted as significant.

Results: Greater RUSATED and SRQ scores were correlated with better subjective cognition, attention, memory, and executive functioning (p 's < .05). In parallel mediation models, RUSATED exerted significant indirect effects on subjective cognition and memory via anxiety and sedentary behavior, and on executive functioning via anxiety. No indirect effects were observed for attention. The SRQ showed significant indirect effects on subjective cognition via depression, anxiety, physical activity, and sedentary behavior. Depression, anxiety, and sedentary behavior were significant mediators for memory, while anxiety and physical activity mediated executive functioning. No indirect effects emerged for attention.

Conclusion: Better global sleep health and greater sleep regularity were associated with better subjective and objective cognitive functioning. Depression, anxiety, physical activity, and sedentary behavior emerged as key psychosocial pathways linking sleep with cognition. Future experimental research is needed to clarify how these psychosocial factors contribute to changes in sleep and cognition in later life.

Support (if any):

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0267

INFRA-SLOW OSCILLATIONS DURING NON-RAPID EYE MOVEMENT SLEEP ACROSS THE LIFE COURSE

Dimitrios Mylonas¹, Naihua Gong², Nataliia Kozhemiako², Shaun Purcell²

¹Harvard Medical School and Mass General Hospital, ²Brigham and Women's Hospital

Introduction: Sleep spindles, hallmark of stage 2 (N2) non-rapid eye movement (NREM) sleep, fluctuate in an infraslow oscillation (ISO; ~0.02Hz) regulated by the noradrenergic system and locus coeruleus. The temporal dynamics of ISOs, their frequency-domain extent, and how they evolve with age remain largely unexplored. Here, we examined how ISOs across a broad frequency range (0.5-30Hz) change across the life course, how different frequency bands synchronize in the infraslow domain, and how ISOs couple with phasic NREM sleep events to better understand their functional role in sleep neurophysiology.

Methods: We analyzed polysomnographic data (N=13,529, age: 3-85 years) from the National Sleep Research Resource. ISO power and peak frequency were derived from the frequency decomposition of the N2 spectrogram (0.5-30 Hz) and averaged across seven canonical bands: slow (0.5-1Hz), delta (1-4Hz), theta (4-7Hz), alpha (7-10Hz), slow sigma (10-12Hz), fast sigma (12-15Hz), and beta (15-30Hz). ISOs were characterized in the time domain after filtering the signals resulted from the first frequency decomposition in the 0.01-0.03Hz.

Results: All frequency bands exhibited infraslow modulation. ISO power and peak frequency showed significant age-related changes, with fast sigma power displaying an inverted U-shaped trajectory and the largest effect size ($\eta^2=.03$, $p<.001$). ISO power was highly reliable within individuals ($r_s>.45$ and $p_s<.001$). Across bands, ISOs showed a characteristic non-sinusoidal waveform in which the negative half-wave was shorter and lower in amplitude than the positive ($p_s<.001$). Time-domain analyses revealed cross-band synchronization: in childhood, slow sigma was followed by fast sigma; whereas in adulthood, fast sigma became the leading rhythm. Slow, fast spindles and slow waves occurred preferentially during the positive half-wave of the fast sigma ISO, an effect more pronounced in adulthood.

Conclusion: ISOs were evident across all frequency bands and showed robust, age-dependent changes in power, peak frequency and waveform independent of average band power. Distinct cross-band synchronization suggests that infraslow modulation during NREM sleep reflects coordinated activity within widespread cortical-subcortical circuits. These findings define normative trajectories of ISO dynamics and their coordination across the life span.

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0268

LIFE-COURSE SLEEP COMPLAINTS AND LONG-TERM COGNITIVE TRAJECTORIES IN ADULTS AGED 45 TO 90+ IN THE US AND UK

Yi Fang¹, Allysa Quick², Sasha Milton¹, Jiawen Chen¹, Nicole Fernandez¹, Andrew Lim³, Lisa Barnes⁴, David Bennett⁴, Meredith Wallace², Yue Leng¹

¹University of California, San Francisco, ²University of Pittsburgh, ³University of Toronto, ⁴Rush University Medical Center

Introduction: Sleep disturbances have been linked to dementia risk, yet given the long prodromal period of neurodegeneration, it remains unclear whether they represent early markers or

modifiable risk factors. A life course approach provides a unique opportunity to disentangle these roles: sleep problems earlier in life are more likely to precede neurodegenerative changes, whereas altered sleep in older adulthood may reflect early neurodegeneration processes already underway. We examined how sleep complaints across different life stages relate to cognitive trajectories over 10-20 years in >15,000 adults aged 45-90+ from the US and UK.

Methods: We analyzed data from the English Longitudinal Study of Aging (ELSA), Whitehall II (WII), and the Memory and Aging Project (MAP). Subjective sleep measures included sleep duration, difficulty falling asleep, difficulty staying asleep, nocturnal awakenings, and waking unrefreshed. Cognition was repeatedly assessed and standardized to cohort-specific Z-scores. Participants with baseline dementia were excluded. We used linear mixed-effects models to test sleep x baseline age x follow-up time interactions, adjusting for demographics and follow-up length.

Results: In ELSA (N = 9,473, age 66.0±9.65, follow-up 7.66±3.44 years), difficulty falling asleep showed a significant interaction with age and time ($P=0.03$). Among adults < 60 years, difficulty falling asleep ≥1 time/week showed an additional 0.97-unit decline in verbal fluency over 10 years (SE [standard error] = 0.04), whereas among adults ≥70 years it was associated with 0.11-unit less decline (SE = 0.05). Similar age-dependent patterns were observed in WII (N = 4,155; age 55.6±5.97, follow-up 15.4±5.05 years) and MAP (N = 1,831; age 79.5±7.67, follow-up 5.43±4.47 years), where insomnia symptoms and < 6-hour sleep were associated with slower cognitive decline at older ages across domains. Findings remained robust after additional adjustment for lifestyle factors, comorbidities, sleep medication use, and APOE ε4 status.

Conclusion: Sleep complaints earlier in life were associated with faster cognitive decline, supporting their role as risk factors. At older ages, shorter and disturbed sleep were linked to slower decline, consistent with degeneration of wake-promoting neuronal systems in prodromal dementia. These findings highlight that the cognitive implications of sleep disturbances vary markedly across the life course.

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0269

SOCIAL CONNECTEDNESS AND SLEEP HEALTH AMONG PEOPLE WITH HIV COMPARED TO HIV-NEGATIVE CONTROLS: PRELIMINARY FINDINGS FROM BOTSWANA

Lu Dong¹, Laura Bogart², David Klein², Edwin Mogaetsho³, Keonayang Kgotsile³, Lisa Hirschhorn⁴, Mosepele Mosepele³

¹Stony Brook University, ²RAND Corporation, ³University of Botswana, ⁴Northwestern University

Introduction: Sleep disturbance is common among people with HIV (PWH), even with viral suppression. Social connectedness may buffer stress-related effects on sleep, yet it is unclear whether objective (network size/diversity) and subjective (loneliness) isolation function differently for PWH and HIV-negative adults. This exploratory study examined associations between social connectedness and sleep disturbance in adults in Botswana.

Methods: We analyzed cross-sectional survey data from 500 PWH (mean age = 52.5; 74% female) and 300 HIV-negative adults (mean age = 53.7; 78% female). Sleep disturbance was assessed using PROMIS Sleep Disturbance. Objective and subjective social

connection were measured using the Berkman-Syme Social Network Index (SNI) and the UCLA Loneliness Scale. Multivariate regressions adjusted for age, and sex, non-HIV comorbidities, and explored moderation by HIV status and age.

Results: PWH had significantly greater comorbidity burdens ($p < .001$) and higher sleep disturbance ($p = .002$) than HIV-negative adults, despite comparable levels of loneliness and SNI. Subjective isolation showed a consistent association with poorer sleep across groups: greater loneliness predicted higher sleep disturbance in both PWH ($b = 4.44$, 95% CI [3.48, 5.41]) and HIV-negative individuals ($b = 3.94$, 95% CI [2.90, 4.99]). Objective isolation demonstrated a group-specific pattern. Among HIV-negative adults, higher SNI, indicating more diverse social networks, was linked to lower odds of moderate-to-severe sleep disturbance (OR = 0.58, 95% CI [0.41, 0.81]). This association was weaker and non-significant among PWH (OR = 0.84, 95% CI [0.65, 1.08]). A significant HIV status $\times$ SNI $\times$ age interaction ($p = .039$) indicated that the protective effect of network diversity was strongest among older HIV-negative adults, while older PWH showed minimal sleep benefit from greater objective social connectedness.

Conclusion: Findings confirm a high burden of sleep disturbance among PWH and suggest that diverse social networks confer less sleep protection for aging PWH than for HIV-negative adults. While reducing loneliness appears beneficial across groups, interventions for older PWH may need to prioritize enhancing the quality and supportiveness of relationships rather than increasing network size. Future work will clarify the relative contributions of loneliness and network diversity to sleep disturbance, particularly among older PWH.

Support (if any): Internal grant from University of Botswana

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0270

USER EXPERIENCE AND PRELIMINARY VALIDITY OF AN EEG HEADBAND VERSUS POLYSOMNOGRAPHY IN PEOPLE WITH COGNITIVE IMPAIRMENT

Anne Chen¹, Ran (Rani) Huo², Emily Xu¹, Gawon Cho³, Brienne Miner¹

¹Yale School of Medicine, ²Yale School of Public Health, ³Yale University

Introduction: We assessed the performance and usability of an electroencephalography headband (HB) compared with polysomnography (PSG) in persons with cognitive impairment and sleep disturbances.

Methods: Twenty-five older adults with mild cognitive impairment or dementia and symptoms of insomnia and/or daytime sleepiness, supported by 22 caregivers, wore HBs (Beacon Biosignals) up to 7 nights and completed home-based PSGs (NOX Medical). We compared total sleep time (TST), wake after sleep onset (WASO), sleep latency (SOL), sleep efficiency (SE), and sleep stages from nights with simultaneous HB and PSG recordings. We calculated intraclass correlation coefficients (ICCs) and examined feasibility of HB use via usability scales and open-ended responses.

Results: Average age was 75.3[SD=5.4] years, 10 (40%) had Alzheimer's disease, 7 (28%) were female, and 24 (96%) were non-Hispanic White. MoCA scores averaged 21.7 (range=6-29). On PSG, averages for TST, WASO, and SE were 427 minutes, 89 minutes, and 79%. Six participants were excluded from analyses due to poor signal quality (i.e., EEG channel quality below 50% across all channels or off-head time >10% of recording). Excluded persons were not different with respect to cognitive scores and all had caregiver support. Among 19 participants, TST and WASO had good agreement with PSG (ICCs ranging 0.61-0.77), while agreement for SOL and SE was lower (ICCs 0.39-0.55). ICCs for N3 and REM sleep were 0.52 and 0.61, respectively, while light (N1 and N2) sleep showed poor agreement (ICC=-0.28). On average, participants wore the HB for 6[1.4] nights, with 36.4% completing ≥ 7 nights. Most participants found the HB easy to use: 22 reported it was not cumbersome, and 21 said it was not overly technical. The lowest-scoring items were related to comfort and sleekness of the HB. Open-ended responses highlighted issues with fit ($n=9$), manual start of recordings ($n=6$), and using the HB with continuous positive airway pressure therapy ($n=2$).

Conclusion: The HB demonstrated good agreement with PSG for TST and WASO and lower agreement for sleep stages. Most participants used the HB for multiple nights. Improvements in feasibility and algorithm performance of the HB are needed to improve sleep assessment in cognitively impaired older adults.

Support (if any):

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0271

A CROSS-SECTIONAL INVESTIGATION OF SLEEP AND MENTAL HEALTH BETWEEN YOUNGER OLDER ADULTS (65-90 YEARS OF AGE) AND OLDER ADULTS (>90 YEARS OF AGE)

Arshee Faizullah¹, Ronan Goel¹, Stuart Quan², Rebecca Robbins¹

¹Division of Sleep Medicine, Harvard Medical School, ²Harvard Medical School

Introduction: Although sleep problems are established correlates of anxiety and depression in older adults, little is known about whether these associations shift in very late life. Using the nationally representative National Health and Aging Trends Study (NHATS), we examined sleep characteristics and their associations with generalized anxiety disorder (GAD) and depressive symptoms between younger older adults (65-90) and older adults (90 years of age and above).

Methods: At baseline, NHATS comprised 6,376 adults age 65 years and above who were representative of 32 million older adults in the US. Additional sleep questions are provided to a random subsample of roughly one third of the cohort during Waves 3 and 4. We categorized participants into 65-90 years of age and greater than 90 years of age and compared sleep characteristics (e.g., duration, snoring) using chi square tests. We then applied logistic regression to estimate associations between each sleep and GAD or PHQ-defined depression. We adjusted for health conditions and smoking and used stratified models to evaluate whether associations differed among younger older and older adults.

Results: Participants in our sample ($n = 2,382$) were 58% female and 81% White non-Hispanic. Older adults have a higher odds of depression ($OR = 1.9, 95\% \text{ CI}: 1.0-3.5$) and anxiety ($OR = 1.9, 95\% \text{ CI}: 1.1-3.3$) than younger older adults. Multiple sleep domains were associated with anxiety and depression. For anxiety, only pain-related sleep disruption predicted anxiety ($OR = 3.8, 95\% \text{ CI}: 1.2-11.7, p = 0.023$) among older adults. For depression, pain-related sleep disruption ($OR = 4.1, 95\% \text{ CI}: 1.2-14.6, p = 0.029$), long ($> 9 \text{ h}$, $OR = 5.6, 95\% \text{ CI}: 1.1-28.0, p = 0.034$) and short ($OR = 5.1, 95\% \text{ CI}: 1.1-24.6, p = 0.043$) sleep duration were significant in older adults, while latency ($OR = 2.0, 95\% \text{ CI}: 1.3-3.1, p = 0.001$), snoring ($OR = 1.6, 95\% \text{ CI}: 1.0-2.6, p = 0.035$), daytime sleepiness ($OR = 1.9, 95\% \text{ CI}: 1.1-3.1, p = 0.015$), and sleep quality ($OR = 0.3, 95\% \text{ CI}: 0.2-0.6, p < 0.001$) were significant in younger older adults.

Conclusion: In summary, these findings indicate that in the oldest adults, mood symptoms are most strongly linked to pain-related sleep disruption and extreme sleep duration. The results underscore the importance of considering both age and specific sleep domains when assessing risk for mood disturbances in older populations, highlighting potential targets for tailored interventions.

Support (if any):

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0272

FROM TRAITS TO SLEEP PATTERNS: PERSONALITY AND MULTIDIMENSIONAL SLEEP HEALTH ACROSS ADULTHOOD

Muhammad Thalil¹, Manacy Pai², Soomi Lee¹

¹Pennsylvania State University, ²Kent State University

Introduction: Personality traits influence health behaviors and outcomes across adulthood, yet their impact on multidimensional sleep health is less explored. We examined longitudinal associations between the Big Five personality traits and sleep health in middle-aged and older US adults to explore how stable personality characteristics influence multiple dimensions of sleep over time.

Methods: We included a longitudinal sample of adults aged 30–84 years ($N = 2,758$) from the Midlife in the United States Study (MIDUS). Baseline personality traits were assessed using 25 items representing the Big Five dimensions from the Midlife Development Inventory. Multidimensional sleep problems were measured using a RuSATED-based composite (regularity, satisfaction, alertness, efficiency and duration) at baseline and again after approximately 9 years. Associations between personality traits and subsequent sleep dimensions were examined using adjusted linear and logistic regression models.

Results: Higher neuroticism was associated with greater sleep problems ($\beta = 0.12, \text{ CI}: 0.05, 0.18$), whereas higher conscientiousness predicted fewer sleep problems ($\beta = -0.12, \text{ CI}: -0.21, -0.04$). For individual sleep outcomes, higher neuroticism was associated with poor sleep satisfaction ($AOR = 1.52, \text{ CI}: 1.31, 1.75$), low efficiency (longer sleep latency) ($AOR = 1.50, \text{ CI}: 1.28, 1.75$), and short sleep duration ($AOR = 1.25, \text{ CI}: 1.07, 1.46$). Greater openness ($AOR = 0.83, \text{ CI}: 0.71, 0.97$) and higher extraversion ($AOR = 0.82, \text{ CI}: 0.71, 0.95$) were both associated with better sleep satisfaction (lower odds of poor satisfaction). Higher conscientiousness predicted better sleep across domains, including greater sleep satisfaction ($AOR = 0.74, \text{ CI}: 0.61, 0.89$) and better daytime alertness ($AOR = 0.77, \text{ CI}: 0.64, 0.93$).

Conclusion: We found that personality traits—particularly neuroticism and conscientiousness—were consistently associated

with multidimensional sleep problems over nine years, indicating that stable psychological characteristics meaningfully shape long-term sleep health. These findings underscore the importance of incorporating personality-based risk profiles into sleep health promotion and intervention strategies.

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0273

FACTORS AFFECTING CAREGIVER REPORTS OF SLEEP IN PERSONS WITH COGNITIVE IMPAIRMENT: A MIXED METHODS ANALYSIS

Ran (Rani) Huo¹, Emily Xu², Anne Chen², Gawon Cho³, Brienne Miner²

¹Yale School of Public Health, ²Yale School of Medicine, ³Yale University

Introduction: Care partners (CPs) are often asked to identify sleep deficiency among persons with cognitive impairment (PwCI). We identified themes associated with agreement between CP reports and objective measures of sleep in PwCIs.

Methods: We conducted a convergent mixed methods study among 11 dyads with simultaneous collection of semi-structured qualitative interviews among CPs, CP-reported quantitative sleep characteristics for PwCIs, and objective measures of sleep from electroencephalography-measuring headbands in PwCIs. Following interviews, PwCIs wore headbands for seven nights. Comparing CP-reported total sleep time (TST) to average objective TST, we grouped dyads into: (1) agreement (< 1 -hour difference), (2) overreporting (CP report ≥ 1 hour more), and (3) underreporting (CP report ≥ 1 hour less). Two coders conducted inductive thematic analysis of interview transcripts to identify themes within each group.

Results: In the agreement group ($N = 4$), routine sleep-related communication, often initiated spontaneously by the PwCI, appeared across the interviews. CPs expressed high trust in PwCI self-report and said that sleep disturbances in PwCI did not affect them. Notably, sleeping apart or having misaligned sleep patterns did not necessarily compromise agreement. In the overreporting group ($N = 4$), CPs frequently believed PwCI were unaware of their own sleep but nevertheless relied on PwCI self-report. Communication about sleep within the dyad was less important in this group, while complaints about excessive sleep or napping were frequently identified. CPs in this group generally viewed sleep issues as less concerning than what PwCIs perceived. In the underreporting group ($N = 3$), CPs described limited direct observation and low confidence in PwCI self-report. Sleep complaints centered on frequent nighttime awakenings and insomnia symptoms. Medication use in PwCIs emerged only in this group. Emotional distress related to caregiving, disease progression, or dyads' relationships was prominent in this group.

Conclusion: Communication frequency, trust in PwCI self-report, and the perceived sleep disturbances meaningfully shape CP proxy reports. Overreporting appears linked to perceptions of excessive sleep and minimal concern about sleep problems, whereas underreporting is connected to insomnia-like symptoms, limited observation, and emotional distress. These patterns highlight clinical situations in which objective evaluation of sleep in PwCIs may be needed.

Support (if any):

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0274

SLEEPINESS, WAKEFULNESS, AND NAPPING SYMPTOMS (SWANS) SCALE PSYCHOMETRIC VALIDATION IN A REPRESENTATIVE U.S. SAMPLERachel Conlon¹, Margaret Kuzemchak², Amy Costa³,
Meredith Wallace³, Daniel Buysse³¹University of Pittsburgh School of Medicine, ²University of Pittsburgh Medical Center, ³University of Pittsburgh

Introduction: Sleepiness is a construct of significant clinical and research interest. Current self-report questionnaires have some limitations, such as asking about sleepiness in situations that an individual might not encounter. We designed the Sleepiness, Wakefulness, And Napping Symptoms (SWANS) scale to address this gap, and assessed the comprehensibility and psychometric properties of the scale among a representative sample of adults in the U.S.

Methods: We conducted expert content review and lexile analysis. We then administered SWANS and other self-reported sleep health measures via YouGov.com (N=2,000; stratified by age, sex assigned at birth, and racial/ethnic identity, representative of the U.S. population). We explored the associations of SWANS items and total scores with legacy measures to establish the construct validity of SWANS. We also conducted receiver operating curve (ROC) analyses to identify thresholds for identifying individuals with and without self-reported sleep disorder symptoms.

Results: SWANS scores ranged across the entire scale (0 to 36), with an average score of 9.88 ± 6.46 . SWANS scores correlated with Ru-SATED 4.0 multidimensional sleep health total scores and alertness scores ($|r| = 0.49$ and 0.52 , respectively). SWANS scores demonstrated acceptable convergent validity ($|r| = 0.52$ to 0.75) with other sleep scales (Epworth Sleepiness Scale, PROMIS Sleep-Related Impairment, Pittsburgh Sleep Quality Index), and significantly differed among those with (n=441, 22%) and without (n=1,558, 78%) sleep disorder symptoms (Cohen's $d = -1.23$, 95% CI=6.45 to 7.66), indicating acceptable known-groups validity. ROC analyses indicated that a score of 11 was the optimal threshold for identifying those with/without a sleep disorder (AUC=0.79).

Conclusion: These findings support the psychometric validity of the SWANS scale as a brief, easy-to-complete survey designed to measure symptoms of sleepiness, wakefulness, and napping. The SWANS may be a viable and helpful tool for assessing the construct of sleepiness in health care and research settings. Future analyses using Item Response Theory will examine the properties of each item to normalize the scale for the general population. Future research is also warranted among clinical populations and on the sensitivity of the SWANS measure to changes in sleepiness following intervention to promote precision medicine approaches.

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0275

DISTURBED SLEEP IS ASSOCIATED WITH FASTER COGNITIVE DECLINE IN MILD COGNITIVE IMPAIRMENTNing Zhang, Jack Johnson, Lichuan Ye
Northeastern University

Introduction: Mild cognitive impairment (MCI) represents a pivotal stage in the trajectory toward dementia. Approximately 15% of individuals with MCI advance to dementia within two years, roughly one-third within five years, while half remain in the MCI stage after ten years. Little is known about the factors driving this high variation. The goal of this study was to investigate the impact of disturbed sleep (i.e., trouble falling asleep, waking up during the night, waking up too early, or not feeling rested) on the progression from MCI to dementia among older adults with MCI.

Methods: This was a longitudinal analysis using data from biannually national survey from U.S.: Health Retirement Survey (HRS) 2006-2022. Survival analysis including Kaplan Meier curves and Cox Proportional Models were used to examine the association of existence of disturbed sleep complaints prior to MCI onset (pre-clinical phase) with the risk and speed of progression from MCI to dementia. GEE models were used to examine the dynamic association of disturbed sleep and cognitive decline (measured by scores) during the MCI phase. All analyses control for demographic characteristics and self-report health status at the wave of MCI onset.

Results: There were a total of 9,428 participants from HRS with newly onset MCI, 1,901 individuals progressed from MCI to dementia, with the average progression time 4 ± 2 years. There were 7,527 respondents who remained in MCI phase during the whole observation. Existence of disturbed sleep complaints during preclinical phase was associated with a faster progression from MCI to dementia: trouble falling asleep (HR=1.14, 95% CI: 1.026-1.267), waking up during the night (HR=1.11, 95% CI: 1.002-1.222), waking up too early (HR=1.117, 95% CI: 1.005-1.242). There was a significant, negative relationship between cognitive scores and sleep disturbances.

Conclusion: Disturbed sleep is associated with a faster cognitive decline. Sleep can be a promising early indicator to identify individuals with MCI at risk for a fast progression to dementia, and to inform effective strategies to delay cognitive decline at the primary care level. More investigations are needed to elaborate the relationship between sleep and cognitive decline prior to and during the MCI phase.

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0276

AGE BUT NOT SEX DIFFERENCES IN THE DISCREPANCIES BETWEEN OBJECTIVE AND SUBJECTIVE ASSESSMENTS OF SLEEPWei Wang¹, Daniel Cohen², Charles Czeisler¹, Claude Gronfier³,
Andrew McHill⁴, Elizabeth Klerman⁵¹Brigham and Women's Hospital, ²Virginia Health Sciences, ³Lyon Neuroscience Research Team, ⁴Oregon Health & Science University, ⁵Massachusetts General Hospital

Introduction: We tested whether sex and/or age affected accuracy of self-report sleep metrics in healthy people.

Methods: Data are from 90 male and 49 female Younger participants (18-34 years) and 14 male and 10 female Older participants (55-74 years). All participants were healthy with no medical, psychological or sleep disorders and free of medications; some were also screened for sleep disorders using clinical PSG. Inpatient schedules included baseline (BL, 24-hr days, 331 sleep recordings) and forced desynchrony (FD; 20.0, 28.0 or 42.85 hr "days"; 2471 sleep recordings) with habitual (1:2 sleep:wake) or chronic

sleep restriction (CSR; 1:3.3 sleep:wake) ratios. Circadian period and phase from FD segments were calculated using core body temperature. Items from a post-sleep questionnaire administered shortly after scheduled awakening about sleep latency, number of awakenings (NWAKE), total sleep time (TST), and duration of awakening before lights on (FINALWAKE) were compared to PSG-recorded sleep for that sleep episode. Linear mixed-effects models were used to quantify the relationships between the differences between objective and subjective sleep measures and factors such as age, sex, and other potential covariates (prior wake duration, the amount of each stage of sleep, the number and duration of bouts of each stage of sleep, and the Habitual/CSR condition) during both BL and FD sections.

Results: During BL, participants overestimated latency to NREM S1 sleep (~6 min) and FINALWAKE (~8 min) and underestimated NWAKE (~4 counts). When adjusted for other factors, there were no age or sex differences. During FD, participants overestimated latency to NREM S1 sleep (~7 min) and underestimated NWAKE (~5 count). When adjusted for other factors, there were no sex differences. For sleep latency, Older participants, compared to Younger participants, had smaller differences for short objective latencies (< 15 min) and a larger differences for long objective latencies (≥ 15 min).

Conclusion: There were no differences between women and men in the accuracy of their self-assessed sleep latency, NWAKE, TST, or FINAL WAKE. There were age-related differences only in some sleep latency metrics. Future work should compare subjective vs objective measures in people with sleep (e.g., insomnia) and other disorders

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0277

AGE-RELATED CHANGES IN LIGHT EXPOSURE, SLEEP AND CIRCADIAN TIMING: FINDINGS FROM THE EPISONO COHORT

Julia Vallim¹, Catharina Scassola¹, Luisa Lopes¹, Gabriela Lima¹, Fernando Louzada², Sergio Tufik³, Monica Andersen³, Vânia D'Almeida¹

¹Universidade Federal de São Paulo, ²Universidade Federal do Paraná, ³Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Actimetry is a noninvasive technique that records the 24-hour rest-activity rhythm to estimate sleep and circadian parameters. Light exposure data can also be derived from these devices, providing an additional and valuable information for basic and clinical research. The aim of the present work was to describe light exposure, sleep and circadian timing across age groups in a sample representing São Paulo city population in terms of age, sex and socioeconomic status.

Methods: This study is a subset of the 769 individuals enrolled in the 4th edition of the São Paulo Epidemiologic Sleep Study (EPISONO) cohort, of which 404 participants were included (60% female; mean age: 49.42 $\pm$ 14.90 years). Actimetry data was collected between 2018 and 2019. Sleep (onset and offset), circadian (predicted dim-light melatonin onset) and light exposure timing (onset of the 10 hours of greatest exposure-oM10) were extracted from the 7-day records (5 weekdays and 2 free days). Generalized linear models, controlled for sex, socioeconomic status, body mass index, season, and daylight-saving time, were applied to

assess the effects of age groups (20-29, 30-39, 40-49, 50-59, 60-69 and 70-80 years).

Results: Significant differences in sleep timing were observed ($p < 0.001$). Participants in the 20-39 years category exhibited later sleep onset and offset compared to older ones. Young adults (20-29 years) had a significantly later light oM10 ($p < 0.001$) and circadian phase ($p < 0.001$) compared, respectively, to participants aged ≥ 40 years and all other age groups.

Conclusion: This population-based study identifies the age of 40 years as a potential turning point in circadian and light exposure patterns, marking a transition from delayed young-adult rhythms to advanced timing in middle and older adulthood. These findings highlight the importance of age-tailored interventions to support sleep and circadian health.

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0278

BIDIRECTIONAL ASSOCIATIONS BETWEEN GAIT SPEED AND MULTIDIMENSIONAL SLEEP HEALTH: EVIDENCE FROM THE MIDUS LONGITUDINAL STUDY

Muhammad Thalil, Soomi Lee
Pennsylvania State University

Introduction: Gait speed and sleep health each reflect key aspects of functional and physiological aging. Although both are predictors of morbidity and mortality, little is known about their longitudinal, bidirectional relationship across adulthood. Slower gait speed may indicate underlying pain, inflammation, or neuromuscular decline that disrupts sleep, while poor sleep can impair physical performance over time. In this study, we examined the reciprocal association between gait speed and multidimensional sleep health among middle-aged and older adults in the US.

Methods: We used two waves of longitudinal data from the Midlife in the United States Study (MIDUS; $N = 687$; ages 34–81 at baseline). Gait speed was assessed using a two-trial 50-foot timed walk, with outcome in meters-per-second. Sleep health was measured using the five-component RuSATED index (regularity, satisfaction, alertness, efficiency, duration), and a composite score created by summing five dichotomized sleep problems, where higher scores reflect poorer sleep health. We estimated cross-lagged panel models to evaluate reciprocal associations between gait speed and sleep health over 9-year period. Models sequentially adjusted for sociodemographic covariates (age, sex, race, education, marital status) and then additional health covariates (BMI, depressive symptoms, chronic conditions).

Results: In sociodemographic-adjusted models, greater sleep problems at baseline predicted slower gait speed at follow-up ($\beta = -0.018$, CI: -0.034, -0.002). Baseline higher gait speed also predicted fewer sleep problems nine years later ($\beta = -0.38$, CI: -0.75, -0.01). After full adjustment for sociodemographic and health covariates, the association from sleep to gait speed remained significant ($\beta = -0.016$, CI: -0.032, -0.001), whereas the reverse association from gait speed to later sleep problems was attenuated and no longer significant ($\beta = -0.22$, CI: -0.60, 0.16). In sex-stratified analyses, the

association from sleep to gait speed remained significant only in men ($\beta = -0.027$, CI: $-0.051, -0.003$), but not in women.

Conclusion: Findings indicate that sleep problems may be a stronger and more consistent predictor of later gait decline than gait speed is of subsequent sleep problems. These results suggest that sleep health represents a potentially modifiable early risk factor for mobility deterioration in midlife and older adulthood, particularly among men.

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0279

CARDIAC HORMESIS IN UNSTABLE SLEEP

Allyson Hughes¹, Ali Tanweer Siddiquee², Seungku Lee², Chol Shin³, Nanhee Kim², Robert Thomas¹, Honghuang Lin⁴

¹Beth Israel Deaconess Medical Center, ²Korea University College of Medicine, ³Institute of Human Genomic Study, College of Medicine, Korea University, ⁴University of Massachusetts

Introduction: Hormesis, an adaptive and protective response triggered by milder stress, has been demonstrated across multiple animal models. Controlled or intermittent hypoxia has shown neuroprotective and cardiometabolic benefits. Whether sleep-related physiological stressors exhibit hormetic effects in humans remains unclear.

Methods: We analyzed data from participants in the Korean Genome and Epidemiology Study (KoGES). Seven sleep quality and stability metrics were derived from photoplethysmography-based cardiopulmonary spectrograms obtained during home ambulatory polysomnography: apnea index during REM sleep, mean apnea duration, Sleep Quality Index (SQI), fragmentation (eLFCbb), and the percent of stable sleep, unstable sleep, and REM sleep. ECG-age was estimated using a validated deep-learning model from 12-lead ECG waveforms. Participants were categorized into normal, accelerated, or decelerated aging groups based on the difference between predicted ECG-age and chronological age (within ± 5 years; > 5 years older; or > 5 years younger, respectively). Logistic regression models adjusted for age, sex, and body mass index were used to assess associations between each sleep trait and aging category, with normal aging as the reference.

Results: The study included 2,237 participants (mean age of 59 ± 7 years, 50.0% female). Among them, 1,682 (75.2%) were classified as normal aging, 277 (12.4%) as accelerated aging, and 278 (12.4%) as decelerated aging. Higher apnea index during REM sleep, longer mean apnea duration, and a greater proportion of unstable sleep were each associated with lower odds of accelerated aging (OR 0.73, 95% CI 0.62–0.86; OR 0.80, 95% CI 0.69–0.94; OR 0.84, 95% CI 0.72–0.97, respectively). Conversely, a higher proportion of stable sleep was associated with higher odds of accelerated aging (OR 1.24, 95% CI 1.07–1.43). Most sleep traits were not significantly associated with decelerated aging, with the exception of fragmentation (eLFCbb), where higher fragmentation modestly increased the odds of decelerated aging (OR 1.15, 95% CI 1.01–1.32).

Conclusion: Several sleep features typically considered undesirable, including higher apnea burden and greater sleep instability, were paradoxically associated with lower electrophysiologic aging. These findings suggest a possible hormetic effect of sleep-related physiological stress on cardiovascular aging and highlight the need for further mechanistic investigation.

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0280

LONGITUDINAL SLEEP-HEALTH PHENOTYPES IDENTIFIED BY HIERARCHICAL CLUSTERING

Antony Passaro, Cameron Good, Kristy Meads
Attune Neurosciences

Introduction: Sleep health is multidimensional, yet most studies examine isolated metrics and overlook how combinations of physiological and behavioral features form stable sleep phenotypes. We utilized hierarchical clustering to identify reproducible sleep-health subgroups within the Sleep Heart Health Study (SHHS) and examined how these phenotypes evolved over 5 years. We additionally validated cluster differences using an independent slow-wave analysis.

Methods: We analyzed data from 1,468 adults who participated in both SHHS-1 and SHHS-2 (5.19 ± 0.27 years apart) who had complete datasets. Forty demographic, clinical, polysomnogram, and pre-sleep awake EEG spectral metrics were z-scored, outliers removed, and clustered using hierarchical agglomerative clustering with Ward's linkage. Optimal solutions were determined via silhouette analysis and visualized using principal component analysis (PCA) and dendrograms. Longitudinal transitions in cluster membership were quantified across the two datasets. To independently validate the clusters, slow waves were analyzed during N2/N3 sleep and eight features (count, density, negative duration, total duration, negative amplitude, total amplitude, up slope, and down slope) were computed to assess physiological distinctions between groups.

Results: Four phenotypes emerged consistently: (1) Mentally Healthy—highest N3 and strongest subjective mental health (2) Light Sleep—lowest N3, highest N1 (3) Physically Unhealthy—oldest, least REM and total sleep (4) Physically Healthy—youngest, longest sleep and REM PCA revealed clear opposition between Clusters 1 vs. 2 and Clusters 3 vs. 4. Only 37.7% of participants remained in the same cluster at the SHHS-2 follow-up, with most cluster transitions shifting toward the Light Sleep phenotype, reflecting age-related deep sleep decline. Slow-wave metrics robustly validated the clusters: the healthiest groups showed the highest amplitude, steepest slopes, and shortest durations, while the Light Sleep and Physically Unhealthy groups exhibited reduced density, flatter slopes, and prolonged durations.

Conclusion: We identified 4 reproducible sleep-health phenotypes with distinct physiological profiles and longitudinal trajectories. Deep sleep characteristics were central in differentiating groups and drove the most common age-related cluster transitions. Independent slow-wave analysis confirmed that these clusters reflect genuine biological differences across phenotypes. Multidimensional phenotyping may improve personalized risk stratification and guide targeted sleep-health interventions during aging.

Support (if any):

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0281

RISK OF BLADDER CANCER AMONG MEN REPORTING NOCTURIA IN THE CANCER PREVENTION STUDY-II NUTRITION COHORT

Charlie Zhong¹, Sidney Donzella², Matthew Masters¹, Helen Parsons³, Erika Rees-Punia¹

¹American Cancer Society, ²University of Washington,

³University of Minnesota

Introduction: Bladder cancer is one of the five most common cancers in men; however, few risk factors have been identified. The 'urogenous contact' hypothesis states that prolonged contact of the urothelium to carcinogens can lead to mutations that induce cancer. Poor sleep health has been associated with increased risk of several cancers, including bladder cancer. Nocturia, the interruption of sleep to urinate, may, in part, explain the relationship between sleep and cancer. Several studies on nocturia and bladder cancer have been conducted but relied on retrospective assessment of nocturia, which may be impacted by recall bias. We sought to evaluate the relationship between nocturia and bladder cancer risk in a prospective cohort.

Methods: The Cancer Prevention Study-II Nutrition Cohort is a population-based study of cancer incidence initiated in 1992. Follow-up surveys were mailed to participants biennially starting in 1997. Nocturia was assessed in men in 1997 and 2003. We stratified models by smoking status (never, former, current) and adjusted for age, education, body mass index, physical activity, hypertension, and use of diuretics. Participants were followed until their last survey, cancer diagnosis, or death. Exposures were updated in 2003. We used a Cox proportional hazards model to calculate hazard ratios (HR) and 95% confidence intervals (95%CI) for the association between nocturia and bladder cancer.

Results: Among 49,767 men, there were 1,207 bladder cancer cases over a median 15.0 years follow-up. Among current smokers, nocturia frequency of 1/night was associated with decreased bladder cancer risk (HR 0.51, 95%CI 0.28, 0.92), but not 2+/night (HR 0.89, 95%CI 0.50, 1.57). Among former smokers, there was elevated, though not statistically significant, risk of bladder cancer associated with nocturia (HR 1/night 1.18, 95%CI 0.92, 1.51; HR 2+/night 1.13, 95%CI 0.88, 1.45). There were no significant associations among non-smokers.

Conclusion: Among smokers, 1 occasion of nocturia may be protective against bladder cancer, suggesting strategies to reduce contact of the urothelium to carcinogens may help reduce cancer risk in this population.

Support (if any): The American Cancer Society funds the creation, maintenance, and updating of the Cancer Prevention Study-II cohort. This analysis was also supported through an unrestricted research grant from Sleep Number Corporation.

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0282

SHARED SLEEP, UNEVEN EFFECTS: ASYMMETRIC LINKS BETWEEN SLEEP, MOOD, AND RELATIONSHIP FUNCTIONING IN COUPLES FACING MILD COGNITIVE IMPAIRMENT

Wendy Troxel¹, Brian Baucom², Matt Euler², Kelly Baron²

¹RAND Corporation, ²University of Utah

Introduction: Sleep and relationship functioning are interdependent, particularly in couples coping with cognitive decline. This study examined how sleep patterns relate to daily mood and relationship quality among couples in which one partner is at risk for mild cognitive impairment (MCI; hereafter referred to as "patient"). The goal was to assess both within-person (day-to-day) and between-person (average) associations, as well as

interdependence (cross-partner effects) between patient and partners' sleep, mood, and relationship functioning.

Methods: Married or cohabiting couples (N= 165 couples; mean age= 64.07; SD= 10.56), with one partner at risk for MCI i.e., patient), participated in a seven-day assessment protocol involving actigraphy and diaries to measure sleep duration and efficiency, alongside daily diary reports of relationship quality and mood. Multi-level actor-partner interdependence models were used to test both within-person (daily fluctuations) and between-person (average across days) associations.

Results: Across diary and actigraphy data, results revealed distinct and interdependent links between sleep efficiency and daily affect. Diary findings primarily suggested links between sleep efficiency and affective outcomes. For patients, higher daily sleep efficiency predicted their own lower same-day positive affect, but higher positive affect in their partners. At the average level, patients who slept more efficiently on average reported lower overall positive mood, whereas partners with higher average sleep efficiency reported higher overall positive mood. Actigraphy findings primarily related to relationship functioning. Patients' average sleep efficiency was unrelated to their own perceptions of support, but when they slept more efficiently, their partners reported higher perceived support. In contrast, partners with higher average sleep efficiency perceived lower levels of support.

Conclusion: Together, these findings demonstrate that daily sleep quality in couples affected by MCI has asymmetric associations with mood and relationship functioning. Sleep efficiency among those at-risk for MCI appears beneficial for their partners' mood and perceived support, while for partners, better sleep may coincide with reduced perceptions of support. These findings highlight sleep as a shared but uneven determinant of emotional and interpersonal well-being in aging couples.

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0283

AGING IMPACT ON SUBC AND A7 NORADRENERGIC INNERVATION OF THE HYPOGLOSSAL NUCLEUS MAY CONTRIBUTE TO THE INCREASED PREVALENCE OF OBSTRUCTIVE SLEEP APNEA

Sophia Jackson¹, Kyle Nguyen-Ngo¹, Irma Rukhadze², Victor B. Fenik¹

¹Laboratory of Sleep and Sleep Disorders, Department of Neuroscience and Experimental Therapeutics, Albany Medical College, ²Albany Medical College, Albany Med Health System

Introduction: Aging has been associated with the neurodegeneration of noradrenergic neurons. We hypothesized that aging may also reduce the excitatory drive from pontine noradrenergic neurons to the hypoglossal nucleus (HN) that innervates upper airway motoneurons, which would contribute to the increased prevalence of obstructive sleep apnea (OSA) in the aging population. We sought to investigate whether aging, one of the major risk-factors of OSA, affects the noradrenergic innervation of the HN originating from A7 and Subcoeruleus (SubC) neurons.

Methods: The young (6-7 months; n=13) and aged (20-28 months; n=8) dopamine β -hydroxylase-(DBH)-cre mice received single unilateral microinjections of AAV8-EF1a-DIO-hChR2-(H134R)-mCherry (10-50 nl) aimed at the A7 and SubC nuclei. Four weeks following AAV-injection, mice were perfused, and brainstem sections were processed with DsRed and tyrosine

hydroxylase immunohistochemistry. We counted all A7 and SubC ChR2-transduced neurons. Then, we counted ChR2-positive axonal projections within the functionally different ventral and dorsal subdivisions of the HN at three anteroposterior (AP) levels: -7.2 mm (rostral), -7.48 mm (middle) and -7.76 mm (caudal) from Bregma. We used the linear regression analysis between the number of ChR2-transduced neurons and the axonal counts, and the analysis of covariates (one-way ANCOVA) to assess the impact of age on the projections to the HN.

Results: In both young and aged mice, the total number of ChR2-positive axonal projections counted within the HN at all three AP levels positively correlated with the number of ChR2-positive neurons located in both SubC and A7 nuclei ($R^2=0.66$, $p<0.001$, linear regression). The projections from A7 neurons to the HN were abolished in aged mice (slope=-0.30 vs. 1.92 in young mice), which was significant at AP-7.48 ($p=0.046$, ANCOVA). However, SubC innervation of the HN was either unchanged (AP-7.2) or showed an unexpected increase in the regression slope with aging at AP-7.48 ($p=0.045$) and AP-7.76 ($p=0.021$, ANCOVA).

Conclusion: Our results suggest that aging leads to degeneration of the A7 noradrenergic innervation of the HN. The SubC innervation of the HN was augmented in aging brain providing partial compensation for the loss of A7-noradrenergic innervation. However, it may not be sufficient to overcome the age-related increase of upper-airway collapsibility in OSA patients.

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0284

ASSOCIATION BETWEEN OVERNIGHT SLEEP FEATURES AND MORNING BRAIN METABOLISM IN OLDER ADULTS

Diego Carvalho¹, Adolf Jindrich², Vaclav Kremen¹, Stuart McCarter¹, Erik St Louis¹, Scott Przybelski¹, Kan Liu¹, Ronald Petersen¹, Clifford Jack³, Val Lowe¹, Jonathan Graff-Radford¹, Bradley Boeve¹, Gregory Worrell¹, Prashanthi Vemuri¹

¹Mayo Clinic, ²Czech Institute of Informatics, Robotics and Cybernetics, Czech Technical University in Prague, ³Department of Radiology, Mayo Clinic

Introduction: The relationship between sleep and brain metabolism remains unclear. This study aimed to examine whether overnight sleep features, using a home sleep apnea system based on peripheral arterial tonometry, are associated with regional FDG-PET changes in older adults.

Methods: We analyzed cognitively unimpaired adults (≥ 60 years) from the Mayo Clinic Study of Aging (MCSA) cohort who were not receiving sleep apnea treatment. Participants underwent overnight sleep assessment with the WatchPAT system, followed by FDG-PET imaging the next morning. FDG-PET data were co-registered to 3T MRI and automatically segmented into 122 anatomical regions. PET signal was referenced to the pons (SUVR). We computed voxel-weighted median FDG signal across 47 bilateral cortical and subcortical regions of interest (ROIs), excluding brainstem and cerebellum. Associations between sleep architecture and sleep apnea/hypoxemia burden and regional metabolism were assessed using partial Spearman's rank correlation, adjusting for age.

Results: Thirty-seven participants were included (70.3% female; median [IQR] age: 72.0 [68.0–78.0] years). Wake after sleep onset (WASO) showed widespread negative associations with FDG

uptake in cortical regions ($p<0.05$), particularly the ventromedial/ventrolateral ($rs=-0.47$ to -0.33) prefrontal cortex, lateral temporal ($rs=-0.38$ to -0.33), and occipital ($rs=-0.47$ to -0.37) cortices. Total sleep time (TST) was positively associated with medial structures ($p<0.05$), including the posterior cingulate ($rs=0.39$), retrosplenial cortex ($rs=0.48$), hippocampus/parahippocampal ($rs=0.34$ to 0.36), calcarine cortex ($\rho=0.38$), thalamus ($rs=0.37$), and caudate ($rs=0.43$). Hypoxic burden was positively associated with medial occipital regions ($rs=0.35$ to 0.39) and AHI-4% with cuneus ($rs=0.33$). Regional gray matter volume did not mediate these associations. WASO correlated with Insomnia Severity Index ($rs=0.43$, $p=0.008$) and self-reported refreshing sleep ($rs=0.046$).

Conclusion: Overnight sleep macrostructure features (WASO and TST) and hypoxic burden are significantly associated with brain metabolism, potentially underlying symptoms of sleep disturbance and cognitive aging.

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0285

IMPACT OF AGING ON A1C1 CATECHOLAMINERGIC INNERVATION OF THE HYPOGLOSSAL NUCLEUS AND THE NUCLEUS OF THE SOLITARY TRACT (NTS)

Kyle Nguyen-Ngo¹, Sophia Jackson¹, Anzor Gvritishvili², Maia Kvizhinadze², Lillian Rogers¹, Victor B. Fenik¹, Irma Rukhadze³

¹Laboratory of Sleep and Sleep Disorders, Department of Neuroscience and Experimental Therapeutics, Albany Medical College, ²VAGLAHS, VA West Los Angeles Medical Center, ³Albany Medical College, Albany Med Health System

Introduction: Aging is associated with neurodegeneration of pontine noradrenergic neurons, which may reduce the excitatory noradrenergic drive to upper airway motoneurons and increase prevalence of obstructive sleep apnea (OSA) in the aging population. We hypothesized that innervation of the hypoglossal nucleus that originates from the medullary A1C1 neurons may contribute to OSA pathophysiology in elderly. We sought to quantify projections from A1/C1 neurons to the hypoglossal nucleus and the adjacent viscerosensory NTS.

Methods: The young (3–4 months; $n=13$) and old (20–23 months; $n=8$) dopamine β -hydroxylase (DBH)-cre mice received unilateral microinjections of AAV8-EF1a-DIO-hChR2-(H134R)-mCherry (100 nl) into the A1/C1 nucleus. Four weeks after the injection, mice were perfused, and medullary sections were processed with both DsRed and tyrosine hydroxylase immunohistochemistry. We counted ChR2-transduced A1C1 neurons. Then we calculated ChR2-positive axonal projections within the functionally different ventral and dorsal subdivisions of the hypoglossal nucleus at three anteroposterior (AP) levels: -7.2 mm (rostral), -7.48 mm (middle) and -7.76 mm (caudal) from Bregma. In the NTS, we measured the percentage area of the ChR2-positive axons at these AP levels. We used the linear regression analysis between the number of ChR2-transduced A1C1 neurons and the axonal counts, and the

analysis of covariates (one-way ANCOVA) to assess the impact of age on the A1C1 catecholaminergic projections to the hypoglossal nucleus and NTS.

Results: We found that the number of ChR2-positive neurons within the A1C1 nucleus positively correlated with the combined ChR2-positive axonal projections within both the ipsilateral hypoglossal nucleus ($p=0.0006$) and NTS ($p=0.0004$) in young and old mice (Pearson correlation). The ANCOVA analysis demonstrated that linear regressions were significantly reduced in older mice in the ipsilateral ventral ($p=0.004$) and dorsal ($p=0.026$) subdivisions of the hypoglossal nucleus at AP -7.2. Similarly, aging negatively impacted the ChR2-positive A1C1 projections to the NTS bilaterally at AP -7.2 ($p=0.026$).

Conclusion: Our results suggest that the catecholaminergic innervation of the hypoglossal nucleus and the NTS, which originates from the A1C1 catecholaminergic neurons, decreases in older mice. The age-related weakening of the A1C1 catecholaminergic drive to the hypoglossal nucleus and NTS may negatively impact the functioning of upper airway muscles and cardio-respiratory function in aging OSA patients, respectively.

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0286

INDOOR LIGHT EXPOSURE AND ITS ASSOCIATION WITH SLEEP IN OLDER ADULTS LIVING ALONE: A YEAR-LONG HOME-BASED STUDY

Kianoush Vali¹, Wan-Tai M. Au-Yeung², Jeffrey Alan Kaye², Clotilde Pierson¹

¹Oregon State University, ²Oregon Health & Science University

Introduction: Light plays a critical role in regulating circadian rhythms and supporting healthy sleep-wake cycles. These functions are especially important in older adults, who are more susceptible to sleep disturbances. However, much of the research on light and sleep in older adults has relied on short-term monitoring of light exposure or self-reports of time spent outdoors. Moreover, many of these studies quantified light using photopic measures rather than circadian-relevant, spectrally derived metrics, such as melanopic Equivalent Daylight Illuminance, which better quantify the non-visual effects of light. There is limited evidence regarding how long-term light exposure at home, given older adults' lower mobility, relates to sleep outcomes.

Methods: We conducted a year-long observational study of 16 older adults (median age: 86 years) living alone in their homes. Spectral light sensors were installed in rooms where participants spent most of their time and were paired with passive infrared occupancy data to assess personal indoor light exposure throughout the day. Objective sleep data were collected using under-mattress sleep sensors. We examined light exposure patterns during daytime and evening hours, as well as time spent out of home, and evaluated their associations with sleep quality and duration.

Results: Participants spent a median of 2.4 hours per day out of the home, slept a median of 6.9 hours per night, had a median wake after sleep onset of 31 minutes, and a median sleeping heart rate of 59.7 bpm. Their personal light exposure at home featured low daytime and slightly elevated evening levels. While only weak relationships were observed, higher daytime and, unexpectedly, higher evening light exposures, as well as more time outside

the home, were associated with better sleep outcomes. Further analyses are ongoing.

Conclusion: In this cohort of older adults living alone, indoor light exposure did not align with prevailing "bright-day, dark-evening" guidelines, which could contribute to circadian disruption and suboptimal sleep. Although all observed effects of light on sleep were weak, some were in line with current recommendations, while others were contrary to these, underscoring the need for further investigation into how everyday indoor light exposure affects sleep in older adults.

Support (if any):

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0287

REPETITIVE THOUGHTS LINKED TO AUTONOMIC DYSREGULATION DURING SLEEP IN OLDER ADULT WOMEN

Susan Rodriguez¹, Amy Costa², Christina McCrae¹, Ashley Curtis³

¹University of South Florida, ²University of Pittsburgh, ³Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida

Introduction: Perseverative thought, characterized by negative repetitive thinking such as rumination and worry, is considered maladaptive and has been linked to poor sleep health, autonomic nervous system dysfunction, and elevated cardiovascular disease (CVD) risk. These associations are particularly relevant in the context of sex differences, as insomnia is more prevalent in women, while findings on sex differences in CVD risk in older age remain inconsistent, highlighting the need to identify sex-specific mechanisms underlying these vulnerabilities. Examining how maladaptive cognitive processes before sleep relate to autonomic functioning during sleep may clarify whether these pathways differ for women and men. This study investigated whether pre-sleep rumination and worry, is associated with autonomic function during sleep in older adults, and whether sex moderates this relationship.

Methods: Sixty-one cognitively healthy older adults (Mage=68.3±4.9 years; 37 women) with no major uncontrolled medical disorders completed the Pre-sleep Arousal Scale-Cognitive subscale (PSAS-cog), assessing cognitive arousal and rumination before sleep, and overnight polysomnography (Sleep Profiler). Moderated regression tested whether PSAS-cog scores interacted with sex in associations with NREM/REM-sleep heart rate (HR) arousal index (brief spontaneous HR changes), controlling for sleep medication use, CVD history, insomnia severity (Insomnia Severity Index), and age.

Results: The overall model was significant and accounted for ~36% REM sleep HR index variance ($R^2=.361$, $p<.001$). The PSAS-cog×sex interaction term was statistically significant ($B=2.16$, $p=.015$). Follow-up conditional effects indicated a significant positive association between pre-sleep cognitive arousal/rumination and REM HR arousal index for women ($B=2.54$, $p<.001$), but not men ($p=.546$).

Conclusion: The association between pre-sleep perseverative thought and REM sleep autonomic arousal in older adults may be sex-specific. Because the present analyses controlled for insomnia severity, the observed associations may reflect a pathway through which perseverative thought contributes to broader sleep disturbance in older women, independent of clinical insomnia. Future research investigating sex-specific mechanisms, such as

declines in circulating estrogen and progesterone during the menopausal transition, which have been shown to affect autonomic regulation, may further illuminate why older women exhibit heightened vulnerability in these pathways.

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0288

THE RELATIONSHIP BETWEEN BASELINE PAIN INTERFERENCE AND SLEEP AFTER NON-CARDIAC SURGERY IN OLDER ADULTS

Mansi Chhajed¹, Mili Jimenez Gallardo¹, Andrea Castillo Suárez¹, Anaëlle E. Charles², Ruixue Cai¹, Kun Hu¹, Lei Gao¹

¹Massachusetts General Hospital and Harvard Medical School,

²Massachusetts General Hospital

Introduction: Sleep disturbances are common among older adults undergoing major surgery, yet factors that influence postoperative sleep remain unclear. Pain interference—how pain disrupts daily functioning—is prevalent in this population and may affect sleep outcomes after surgery. To address this gap, we examined whether greater baseline pain interference was associated with greater deterioration in sleep quality from baseline to one month postoperatively.

Methods: A cohort of 40 older adults (≥ 70 years) scheduled for total knee, total hip, or spine surgery, was recruited, completed the Pittsburgh Sleep Quality Index (PSQI) one week before surgery (baseline) and again at 1 month postoperatively. Pain interference was measured using the PROMIS Pain Interference T-score. The primary outcome was change in sleep quality from baseline to 1 month. We conducted linear regression analyses to examine whether baseline pain interference predicted postoperative changes in PSQI scores. Additional factors evaluated included age, sex, baseline PSQI score, and surgical type (joint, general and vascular surgery).

Results: Greater baseline pain interference was associated with higher PSQI score after adjusting for age, sex, and baseline ($\beta = 0.13$, SE = 0.05, $p = 0.018$). However, after including surgical type in the model, the association was attenuated and became statistically significant ($\beta = 0.11$, SE = 0.06, $p = 0.077$). Surgical type was not associated with postoperative sleep change.

Conclusion: These preliminary findings suggest that older adults with greater preoperative pain interference may experience larger declines in sleep quality up to a month after non cardiac surgery. Future Analysis with larger sample, longer follow ups (3-12 months) and additional adjustments for postoperative health status, and repeated pain and sleep assessments is warranted to assess the longitudinal relationship between pain and sleep trajectories after surgery.

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0289

COMPUTATIONAL MODELING OF SLEEP OPPORTUNITY IN COLLEGE STUDENTS UNDER ACADEMIC AND SOCIAL SCHEDULE CONSTRAINTS

Andrew Wong

University of Michigan

Introduction: College students frequently report insufficient sleep, but the extent to which structural schedule constraints alone—independent of individual behavior—limit sleep opportunity is not well quantified. In this study, we developed a computational simulation model to estimate how academic schedules, evening obligations, and weekend variability shape the maximum achievable sleep window in a synthetic student population.

Methods: We constructed a Monte Carlo agent-based model generating 10,000 synthetic weekly schedules based on distributions of publicly available university class times. Morning constraints were drawn from a normal distribution centered at 9:30 (SD=1.2 h). Evening constraints (labs, extracurriculars) were sampled from empirical distributions with a 30% probability of extending past 20:00. Study blocks were assigned using a Poisson process ($\lambda=1.8/\text{day}$). Sleep opportunity was defined as the longest continuous interval between the day's final constraint (plus a 45-min wind-down buffer) and the next morning's earliest constraint (minus a 45-min preparation buffer). Weekend days removed academic constraints but preserved social obligations with higher variance. Simulations were stratified into STEM-like and non-STEM-like schedules based on evening course likelihood.

Results: Across all schedules, the mean weekday sleep opportunity was 6.41 ± 1.05 hours, compared to 8.12 ± 1.32 hours on weekends ($p < .001$). Only 14.7% of weekday nights allowed ≥ 8 hours of potential sleep. STEM-modeled schedules produced 22.9% fewer nights with ≥ 8 hours opportunity than non-STEM schedules (12.1% vs. 15.7%). Schedules containing evening labs delayed modeled bedtime by 1.08 hours, reducing sleep opportunity by 0.74 hours per affected day. The highest restriction occurred in students with both early-morning classes and ≥ 2 evening constraints, yielding an average weekday opportunity of 5.38 hours.

Conclusion: Structural features of typical college schedules substantially restrict sleep opportunity even before accounting for student behavior. These simulations show that many students may be potentially chronically limited by schedule architecture alone, suggesting a need for academic policy reforms. Computational modeling provides a scalable method for assessing population-level determinants of sleep health without requiring human-subjects data.

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0290

CHOLESTEROL LEVELS PREDICT SLEEP QUALITY, TOTAL SLEEP DURATION, AND REM SLEEP DURATION AMONG BLACK ADULTS

Jaden Rodriguez¹, Brittany Larsen², Matthew Betancourt¹, Gabrielle Belony¹, Aisha Coralie Severe¹, Daniel Felipe Barba¹, Elizabeth Mirabal¹, Carla Gibbs¹, Chloe Martin³, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³Department of Social Sciences, School of Liberal Arts & Sciences State University of New York

Introduction: Both cardiovascular disease and sleep disturbances disproportionately affect Blacks. Yet, early detection and prevention remain challenging. Recent work has linked cardiovascular risk to sleep metrics (i.e., sleep duration and quality), but investigations of blood lipid levels in Black populations remain scarce. Furthermore, most published studies rely on laboratory-based polysomnography, although portable PSG and wearable sleep-tracking devices allow for accurate monitoring in real-world environments. Novel wearable sleep devices enable investigators to capture sleep patterns and ascertain their associations with cardiovascular disease. In this study, we investigated whether cardiovascular disease markers are associated with sleep metrics among Black adults.

Methods: Sample included 204 Black adult participants from two NIH-funded studies (MOSAIC and ESSENTIAL). Sleep metrics (sleep quality index (SQI) and rapid eye movement (REM) and sleep duration) were recorded via a SleepImage Ring for 7 consecutive nights. Fasting lipid profiles (total cholesterol, high-density lipoproteins (HDL), low-density lipoproteins (LDL), triglycerides) were obtained based on plasma obtained through venipuncture and a total cholesterol: HDL ratio was calculated as: total cholesterol/HDL. A linear regression model assessed whether biomarkers of cardiovascular risk were associated with sleep outcomes.

Results: TC: HDL-c ratios ($F [9,195] = 5.55$, $R^2 = 0.20$, $p < 0.001$) and LDL ($F [9,194] = 5.33$, $R^2 = 0.20$, $p < 0.001$) values were inversely correlated with SQI. Specifically, lower TC: HDL-c ratios ($\beta = -0.16$, $p = 0.02$) and LDL ($\beta = -0.14$, $p = 0.04$) values were associated with increased SQI. Additionally, TC: HDL-c ratios ($F [9,195] = 3.40$, $R^2 = 0.14$, $p < 0.001$) and LDL values ($F [9,194] = 2.44$, $R^2 = 0.10$, $p = 0.01$) predicted REM sleep duration; specifically, lower TC: HDL-c ratios ($\beta = -0.24$, $p < 0.001$) and LDL values ($\beta = -0.15$, $p = 0.04$) were linked to reductions in REM sleep. Furthermore, lower TC: HDL-c ratios ($F [9,195] = 2.37$, $R^2 = 0.10$, $p = 0.01$) predicted longer sleep duration ($\beta = 0.26$, $p < 0.001$), whereas LDL values did not ($F [9,194] = 1.20$, $R^2 = 0.05$, $p = 0.30$). Finally, triglyceride values did not show significant associations with any sleep metrics.

Conclusion: Reduced levels of plasma-based lipids (LDL, total cholesterol: HDL) significantly predicted increased sleep quality as well as total sleep duration and REM sleep duration. Integrating wearable-derived sleep metrics with cholesterol biomarkers may be useful in enabling clinicians to identify at-risk individuals before disease develops, thus facilitating application of available preventive strategies.

Support (if any):

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0291

SLEEPINESS AND SUBJECTIVE WELL-BEING AS PREDICTORS OF FUNCTIONAL IMPAIRMENT AMONG FASTING ADULTS IN NIGERIA

Jesujoba Olanrewaju¹, Fiyinfunjah Dosumu²

¹Department of Psychology, North Dakota State University,

²Department of Psychology, University of South Florida

Introduction: Voluntary religious fasting, prevalent across many African settings, may impair sleep due to circadian rhythm disruptions and altered meal timing, with downstream effects

on daytime functioning. Fasting may predispose individuals to increased sleepiness and altered psychological well-being, both established predictors of functional impairment. However, sleep during fasting remains understudied in African populations, where unique sociocultural contexts limit our understanding of these relationships. This cross-sectional study examined the independent and interactive effects of sleepiness and subjective psychological well-being on functional impairment among fasting adults in Nigeria. We hypothesized that higher sleepiness would predict greater impairment, higher subjective psychological well-being would predict lower impairment, and that well-being would moderate the sleepiness-impairment relationship.

Methods: Participants (N = 138; Mean age = 31.14, SD = 11.08; 57% female), fasting for at least two weeks, completed an online survey hosted on Google Forms, which included the Epworth Sleepiness Scale, WHO-5 Well-Being Index, and PROMIS Sleep-Related Impairment Scale. Hierarchical linear regression tested the main effects of sleepiness and subjective psychological well-being, and the moderating effects of sleepiness and subjective well-being on sleep-related impairment.

Results: The main effects model explained significant variance in functional impairment ($R^2 = .196$, $p < .001$). Higher daytime sleepiness strongly predicted greater impairment ($\beta = .58$, $p < .001$), while higher psychological well-being independently predicted lower impairment ($\beta = -.26$, $p = .022$). Contrary to hypotheses, the sleepiness and well-being interaction was non-significant ($p = .954$), indicating that psychological well-being does not buffer the impairing effects of daytime sleepiness.

Conclusion: Daytime sleepiness and psychological well-being contribute independently rather than interactively to functional impairment during fasting. These findings suggest that fasting individuals experiencing daytime impairment may benefit from interventions that directly address sleep deficits alongside efforts to promote better psychological well-being. Given the widespread practice of religious fasting globally, understanding these independent pathways has important implications for promoting health and productivity during fasting periods. Future research should investigate whether sleepiness and well-being operate through distinct mechanisms to improve the health of diverse fasting populations.

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0292

INDOOR SLEEP ENVIRONMENT AND SLEEP HEALTH IN LOW-INCOME OLDER ADULTS: A CONVERGENT MIXED-METHODS STUDY

Youngmin Cho¹, Shuxian Hua², Zixuan He³, Russell Calderon¹, Sofia Liu¹, Wenxuan Fan¹, Claire Wang¹, Junxin Li¹

¹Johns Hopkins University School of Nursing, ²University of North Carolina at Chapel Hill, Gillings School of Global Public Health, ³Bloomberg School of Public Health, Johns Hopkins University

Introduction: Low-income older adults are disproportionately exposed to suboptimal housing conditions, yet the specific impact of indoor environment on their sleep health remains understudied. This study investigated the relationship between indoor environmental factors and sleep health, while concurrently exploring their lived experiences of sleep environment stressors.

Methods: We conducted a convergent mixed-methods study with data from an ongoing intervention study involving 69 low-income

community-dwelling older adults. Objective sleep environment, including air parameters (particulate matter [PM], temperature, humidity, CO₂), sound, and light levels, was assessed for 7 consecutive days using sensors placed in the bedroom. Participants self-reported subjective sleep environment, such as noise, light, temperature, and bedding comfort, using the Assessment of Sleep Environment (ASE). Objective sleep health was measured using wrist actigraphy (ActiGraph): sleep time, efficiency, number of awakenings, and Wake After Sleep Onset (WASO). Subjective sleep health was assessed using the Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI). Correlations and linear regressions were used to understand the associations between nighttime/evening environmental exposures and sleep outcomes. Thirty-two semi-structured interviews were conducted to explore perceived sleep environment stressors. Qualitative data were analyzed using a qualitative descriptive approach with thematic analysis.

Results: Objective nighttime environmental exposures exceeded recommended sleep thresholds in 28.3%–47.8% of cases. Higher PM exposure during both evening and nighttime was significantly associated with poorer sleep efficiency and increased fragmentation (i.e., awakenings and WASO). Self-reported poor sleep environment (specifically, excessive heat and humidity) was linked to increased PSQI and ISI scores. Five themes regarding sleep environment stressors emerged: 1. Ambient thermal conditions; 2. Mixed perceptions of lighting and safety; 3. Contradictory roles of sound; 4. Intrusive smells (smoking smells); 5. Multidimensional causes of nighttime awakenings.

Conclusion: Our analysis highlights that objective air pollution (PM) and perceived heat and humidity are associated with poor sleep in low-income older adults. Clinicians should prioritize environmental screening and person-centered strategies—including air filtration and bedroom optimization—to target these modifiable risks and support sleep in low-income older adults. Future studies should employ longitudinal, sensor-based designs to understand cumulative environmental effects on sleep outcomes.

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0293

ASSOCIATIONS BETWEEN ACTIGRAPHY SLEEP AND WEIGHT CHANGE OVER 12 MONTHS IN BLACK EMERGING ADULTS; INITIAL RESULTS FROM THE SHOW STUDY

Jessica McNeil, Hannah Koch, Bryan Montero Herrera, Stephanie Pickett, Aubrey Kehoe, Laurie Wideman
University of North Carolina at Greensboro

Introduction: Despite higher risk of short sleep duration and obesity in Black emerging adults (ages 18–28 years) compared to peers in other racial groups, no study has comprehensively assessed sleep and changes in body weight and composition in this population. We examined preliminary associations between actigraphy-assessed sleep (duration, efficiency, timing midpoint, and day-to-day variability calculated as coefficients of variation) at baseline with changes in body mass index (BMI), body composition (fat mass index (FMI) and fat-free mass index (FFMI)) and waist circumference (WC) over 12 months in the Sleep, Health Outcomes and Body Weight (SHOW) study.

Methods: The SHOW study aims to recruit 150 Black emerging adults to evaluate 12-month changes in sleep and body weight/composition. Sleep was measured with 7-day accelerometry, and body weight, composition, and central adiposity were assessed during an in-laboratory visit. Paired t-tests assessed changes in sleep (n=41; 30 females) and body weight/composition (n=44; 32 females) from baseline to 12 months. Partial Pearson correlations assessed associations between baseline sleep and 12-month changes in body weight/composition, controlling for age and sex.

Results: At 12 months, BMI (26.3 ± 1.0 , 26.9 ± 1.0 kg/m²; $t(43)=2.4$, $p=0.01$) and FMI (7.9 ± 0.8 , 8.5 ± 0.8 kg/m²; $t(43)=2.4$, $p=0.01$) had increased, but FFMI (17.0 ± 0.5 , 17.2 ± 0.5 kg/m²; $t(43)=0.96$, $p=0.17$) and WC (81.6 ± 2.0 , 83.2 ± 2.5 cm; $t(43)=1.6$, $p=0.06$) did not. Over 12 months, mean sleep duration remained short (358 ± 9 , 360 ± 11 minutes; $t(40)=0.2$, $p=0.42$), sleep efficiency poor (70.6 ± 1.3 , $70.2 \pm 1.3\%$; $t(40)=-0.3$, $p=0.61$) and sleep timing midpoint late ($5h28AM \pm 1h05$, $5h36AM \pm 1h06$; $t(40)=0.2$, $p=0.44$). Variability in sleep duration (23.2 ± 1.4 , $22.9 \pm 1.3\%$; $t(40)=-0.2$, $p=0.56$), efficiency (14.7 ± 1.0 , $13.9 \pm 0.9\%$; $t(40)=-0.5$, $p=0.70$) and timing midpoint (21.0 ± 1.9 , $19.9 \pm 1.6\%$; $t(40)=-0.4$, $p=0.67$) did not change over time. Positive associations were noted between baseline sleep timing variability and changes in WC ($r=0.41$; $p=0.006$), whereas an inverse association was noted between variability in baseline sleep efficiency and changes in FMI ($r=-0.31$; $p=0.04$).

Conclusion: Initial evidence indicates poor sleep behaviors were coupled with weight and fat mass gains over 12 months in Black emerging adults. Furthermore, greater variability in sleep timing midpoint, but lower variability in sleep efficiency, were associated with greater increases in total and central adiposity over 12 months.

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0294

HOW DIFFERENT SMARTPHONE APPLICATION CATEGORIES IMPACT SLEEP IN COLLEGE STUDENTS

Heshey Nemer, Linying Ji

Montana State University

Introduction: Sleep plays a pivotal role in academic success, physical health, and mental health, yet college students often compromise their sleep through irregular sleep schedules and heightened stress. Smartphone use prior to sleep onset can delay circadian rhythms, reduce melatonin production, and contribute to fatigue. Not all screen time affects sleep the same way; different application categories influence distinct brain systems. Social media rapidly releases dopamine, increasing irritation when deprived and contributing to mental fatigue. Gaming increases heart rate and emotional arousal. These physiological and psychological responses demonstrate that not all smartphone activities have equal impact on sleep health. With smartphones acting as a constant source of stimulation, and most college students owning one, understanding how specific application types affect sleep is essential.

Methods: Participants will be college students at least 18 years old enrolled at Montana State University. Recruitment will include flyers and will aim for diversity in background, age, and lived experiences. Data from a previous pilot study will be combined with new data. Participants will complete an intake survey assessing sleep, screen time habits, stress, and mental health. For four

weeks, participants will wear a GENEActiv device to collect sleep-related movement, temperature, and light data. Screen time will be recorded using an approved tracking application measuring total time, hourly patterns, and app categories. Daily surveys will capture emotions and prior-night sleep. After data collection, participants will complete a one-on-one interview about their screen time and sleep patterns. Device data will be processed using a validated program, and screen time data will be synthesized using Python.

Results: The dataset will include objective phone-use metrics, subjective sleep and well-being measures, demographic variables, longitudinal patterns, and covariates such as bedtime phone use and nighttime awakenings. These combined layers will allow examination of how stress, application categories, and daily fluctuations influence sleep continuity and quality.

Conclusion: Together, these factors illustrate how the interaction between stress, technology use, and neurophysiology places college students at heightened risk for disrupted sleep. Understanding how specific application categories affect sleep will guide evidence-based recommendations for improving both technology habits and sleep health.

Support (if any):

Abstract citation ID: zsa091.0295

0295

DO ACHY JOINTS MEAN SLEEPLESS NIGHTS? INSIGHTS FROM WEARABLE DATA IN THE ALL OF US RESEARCH DATASET

Amaan Viridi, Will Potratz, John Abdallah, Frank Scali, Mehul Chowdarapu, Ryan Lewis
California University of Science and Medicine

Introduction: Degenerative musculoskeletal (MSK) conditions such as osteoarthritis, low back pain, neck pain and rheumatoid arthritis, affect approximately 1.3 billion people worldwide. Sleep disturbances including insomnia, poor sleep quality, and sleep disordered breathing, are commonly reported among patients with chronic degenerative MSK conditions, especially osteoarthritis, yet population level studies on this association remain limited.

Methods: We conducted a retrospective cohort study using Fitbit sleep data from NIH All of Us Registered Tier Dataset v8. Adults with documented arthropathy or spondylosis were included in the test group. Exclusions comprised primary sleep disorders, neurologic or cardiopulmonary conditions affecting sleep, missing Fitbit data, and use of known sedatives (e.g., benzodiazepines, barbiturates). The test group was compared with a control sample of 3,000 individuals randomly selected from 29,956 eligible controls. Sleep duration, efficiency, and stage-specific metrics were derived via standardized R pipelines, and between-group differences were evaluated using two-sample tests and adjusted regression models.

Results: A total of 5,953 participants were included (test: $n = 2,953$; control: $n = 3,000$). Across primary sleep metrics, between-group differences were generally small. Time in bed showed no meaningful difference (386.1 vs. 383.6 min; $p = 0.29$). Total minutes awake were similar (44.6 vs. 44.4 min; $p = 0.64$). Restless minutes demonstrated a statistically significant but clinically minimal reduction in the test cohort (15.5 vs. 16.8 min; $p = 0.01$). The most notable finding was a reduction in minutes spent awake after waking (51.3 vs. 75.2 min; $p < 0.001$), indicating modest but consistent improvement in post-awakening consolidation.

Conclusion: The MSK cohort exhibited a statistically significant lower number of minutes spent awake after waking. However, other sleep metrics including, time in bed, and total awake minutes, showed minimal variation between the groups. Overall, individuals with MSK conditions demonstrated largely similar sleep profiles to controls, indicating that degenerative MSK conditions have limited impact on objective sleep architecture.

Support (if any):

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0296

EXAMINING HOW COMMUNITY HEALTH WORKERS CAN SUPPORT ENGAGEMENT IN DIGITAL COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA

Dan Schober, Julia Napolitano, Tetyana Krutsik, Riya Patel, Joanna Buscemi
DePaul University

Introduction: Digital Cognitive Behavioral Therapy for Insomnia (dCBT-I) shows promise for reaching people who experience insomnia but may not be willing or able to complete traditional in-person CBT. However, only approximately 50% of dCBT-I treatment components are completed. Community Health Workers (CHWs) are trusted members of the health workforce who could support engagement in dCBT-I. This poster examines how CHWs could help patients engage with and complete all dCBT-I components to improve sleep health.

Methods: We facilitated 8 focus groups via video conference with 29 CHWs who had at least 1 year of experience and were working with racial and ethnic minorities in a large urban city. In this poster, we focus on the interview question, "Can you describe how you would help patients using a digital [CBT-I] program, complete all the treatment cores?" Focus groups were transcribed and thematically coded and reviewed for consensus.

Results: The most frequent strategies that CHWs identified to support engagement with and completion of dCBT-I were: 1.) Technological Support, 2.) One-on-One Guidance, 3.) Reminders, and 4.) Incentives. Ideas for Technological Support most often involved helping get the participant set up and comfortable with the dCBT-I program. Further, CHWs described supporting the navigation of the program and promoting overall digital literacy. One-on-One Guidance consisted of goal setting, encouragement, and general support. Reminders involved regular check in's – typically weekly – to assure progress and address barriers to completion. Incentives were seen as a way to reinforce progress and make the distal goal of better sleep more tangible in the short term. Ideas for incentives included gift cards, cash, and small gifts. Other themes that emerged included "selling" the effectiveness of dCBT-I – specifically through success stories, understanding and addressing hesitancy to engage with dCBT-I, and leveraging participant motivation to begin dCBT-I.

Conclusion: Digital CBT-I has the potential to reach racial and ethnic populations that cope with untreated insomnia. CHWs could play a critical role in helping these populations adopt and complete dCBT-I to address their insomnia, promoting sleep health equity.

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0297

MIDNIGHT MUNCHIES: HOW DOES COMPOSITION OF THE LAST FOOD INTAKE BEFORE BED AFFECT SLEEP EFFICIENCY

Addison d'Hulst, Benjamin McBride, Sadie Noel, Olivia Hubble, Kara M. Duraccio
Brigham Young University

Introduction: The foods you choose at night may make or break your sleep. Prior research reveals a relationship between diet and sleep, where dietary composition affects sleep quality. High intake of saturated fat and simple carbohydrates, in combination with late-night or irregular eating patterns, has been linked to impaired sleep architecture and circadian disruption. We hypothesized that greater calories and grams of sugar, and carbohydrates consumed from the last meal would reduce sleep efficiency, with caloric intake showing a non-linear effect.

Methods: 28 adolescents completed a one-week protocol assessing links between dietary intake and sleep. Sleep efficiency was measured with actigraphy watches, and dietary intake was collected using the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA-24). Multiple recalls per participant provided 94 dietary data points, which matched 65 next-night sleep actigraphy data. We ran separate regressions examining how kilocalories, carbohydrates, and sugar intake before bedtime predicted sleep efficiency. Second, a quadratic regression tested the non-linear relationship between kcal and sleep efficiency.

Results: Kilocalories, fat, protein, sugar, and carbohydrates consumed before bed significantly predicted sleep efficiency ($F(5,59)=2.90$, $p=0.0207$), accounting for 20% of its variance ($R^2=.20$). Kilocalories alone did not significantly predict sleep efficiency ($b=-0.73$, $p=0.51$). However, sugar consumption significantly predicted sleep efficiency ($F(1,63)=10.51$, $p=0.002$), with higher sugar linked to poorer sleep efficiency ($b=-.07$, 95%CI[-.12, -.03]). Carbohydrate consumption also significantly predicted sleep efficiency ($F(1,63)=4.30$, $p=0.04$), with higher intake reducing efficiency ($b=-.03$, 95%CI[-.06, -.001]). A third regression with a quadratic term ($F(6,58)=2.45$, $p=0.0355$, $R^2=.20$) indicated that neither the linear ($b=-0.77$, $p=0.498$) nor quadratic term was significant ($b=0.00$, $p=0.576$).

Conclusion: Altogether, our analyses showed that it is not the total amount of energy consumed before bed, but rather the composition of that intake that shapes adolescent sleep efficiency. Kilocalories did not uniquely predict sleep efficiency when other macronutrients were considered; however, higher sugar and carbohydrate consumption independently predicted poorer sleep efficiency. These findings point to metabolic and glycemic-related pathways as more salient for sleep disruption than overall caloric intake. Future sleep promotion interventions may benefit from targeting nutritional quality, including limiting simple sugars and refined carbohydrates before bed.

Support (if any):

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0298

NAPPING BEHAVIOR AT THE US / MEXICO BORDER AND MENTAL HEALTH – DATA FROM THE NOCHES STUDYAbhilasha Kothapeta¹, Andrea Diaz-Pacheco¹, Elizabeth F. Rasmussen¹, Patricia Molina¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Sadia B. Ghani⁴, William Killgore¹, Michael Grandner¹¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴Southern Arizona Veterans Affairs Health Care System**Introduction:** Previous community-based studies have shown that daytime napping is associated with worse mental health, yet this has not been explored among working-age adults at the US-Mexico border.**Methods:** Data were collected from 992 working-age adults (age 25-60) living at the US-Mexico Border. Napping was assessed with: “How often do you take naps during the day (lasting for less than 1 hour)?” Responses were either “Never,” “1/month or less,” “1/week or less,” “2-5 times per week,” or “5/week or more.” Mental health variables including total scores on the PHQ9 depression scale, GAD7 anxiety scale, Multidimensional Scale of Perceived Social Support (MSPSS), Perceived Stress Scale (PSS), and Social Vigilance Questionnaire (SVQ). Linear regression analyses were adjusted for age, sex, education, and language of administration. Interactions with subjective and objective sleep duration, Pittsburgh Sleep Quality Index (PSQI) score, and degree of perceived control over sleep (BRISC score).**Results:** Napping data was reported by N=970 respondents. 56.2% reported never napping., 16.2% reported naps 1/month or less, 14.4% reported naps 1/week or less, 10.1% reported naps 2-5 times/week, and 3.1% reported naps 5 times/week or more. Higher depression scores were seen for those who report naps 2-5 times/week ($B=0.84$, 95%CI [0.06, 1.63]) and 5+ times/week ($B=3.71$ 95%CI [2.33, 5.10]). Higher GAD7 scores were associated with naps 5+ times/week ($B=1.45$ 95%CI [0.31, 2.58]). Higher social vigilance was associated with naps 1/month or less ($B=2.60$ 95%CI [1.24, 3.95]). Significant interactions were seen for PHQ9 (nap-by-BRISC), MSPSS (nap-by-BRISC), and SVQ (nap-by-PSQI). Post-hoc analyses examined marginal effects.**Conclusion:** Frequent napping was associated with higher depression and anxiety, while infrequent napping was linked to greater social vigilance than no napping. These associations varied with overall sleep quality and circadian patterns. Future work should more fully explore the role of acculturation and napping circumstances (such as employment/work).**Support (if any):** R01MD011600, R01MH135978

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0299

CHRONOTYPE AND SCHOOL START TIME AS DETERMINANTS OF ADOLESCENT SOCIAL JETLAG: A CROSS-SECTIONAL ANALYSISSilvana Solsoloy¹, Sheryll Soriano²¹Johns Hopkins University, ²UCSF Fresno/VA Central California Health Care System**Introduction:** Social jetlag (SJL)—the misalignment between endogenous circadian rhythms and externally imposed

schedules—has emerged as a critical concern in adolescent sleep research. Although California’s delayed school start mandate aims to mitigate sleep deprivation, the relationship among start time, chronotype, and SJL remains underexplored in U.S. adolescents. Moreover, subclass differences across grade levels have not been thoroughly investigated. This study examines how school start time and chronotype affect SJL, sleep duration, and bedtime variability among high school students in Fresno, California (late-start) and Peoria, Illinois (early-start).

Methods: A cross-sectional online adaptation of the Munich Chronotype Questionnaire (MCTQ) was administered to 632 students (grades 9–12) from early-start (7:30 AM; $n = 222$) and late-start (8:30 AM; $n = 410$) schools between December 2024 and February 2025. SJL was defined as the absolute difference between mid-sleep on school-free and school nights. Chronotype classifications (morning, intermediate, evening) were based on mid-sleep on free days. T-tests compared SJL, sleep duration, and bedtime variability across start times, grade levels, and chronotypes ($p < 0.05$). One-way ANOVA assessed differences in SJL across chronotypes.**Results:** School start time alone did not significantly reduce SJL ($p = 0.776$). Mean SJL across all participants was 4.76 hours—substantially higher than in prior non-U.S. adolescent cohorts (1.5–2.5 hours)—suggesting cultural or systemic amplification of circadian misalignment. Chronotype was a major determinant: evening types showed greater SJL than morning types ($p < 0.05$), and ANOVA confirmed significant differences among all three chronotypes ($p < 0.05$), with intermediate types displaying intermediate SJL. Grade level also influenced outcomes: upperclassmen had shorter weekday sleep duration ($p = 0.006$) due to later bedtimes, while weekend sleep duration did not differ significantly ($p = 0.169$), indicating limited recovery.**Conclusion:** Addressing adolescent sleep deprivation may require more than policy reforms. Interventions tailored to chronotype (especially for evening-type upperclassmen) and strategies that address behavioral contributors to sleep loss could be more effective. Future research should consider regional and cultural influences when designing sleep health interventions in U.S. adolescents.**Support (if any):**

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0300

PERCEPTIONS OF RACIAL IDENTITY AND NEIGHBORHOOD ENVIRONMENT EFFECTS ON SLEEP AND MENTAL HEALTH AMONG BLACK ADOLESCENTS – DIS/ENGAGEMENT AS COPING

Todd Obilor

University of Washington

Introduction: Sleep is an integral part of adolescent development, yet Black adolescents are more likely to report poorer sleep compared to all other ethnic groups. While there has been speculation about the many predictors of poorer sleep for Black youth, neighborhood environment and racial discrimination seem to be most relevant.**Methods:** Utilizing a qualitative design with semi-structured interviews, this study examined factors affecting sleep, mental health, and coping strategies in Black adolescents ($n = 14$; ages 14–18 years old), as well as recommendations for protective factors to promote sleep health in adolescent development. In both individual and group interviews, questions included adolescent’s racial

identity, experiences with racism, neighborhood environment, sleep beliefs and habits, mental health, and coping strategies.

Results: Several themes arose concerning factors for adolescent's feelings of racial identity, barriers to sleep, and experiences with mental health and coping.

Conclusion: These results offer opportunities to further explore causes of sleep disparities in Black adolescent populations as well as strategies to increase positive sleep and mental health outcomes.

Support (if any): n/a

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0301

SLEEP HEALTH AND RACE/ETHNICITY AMONG US TEENS – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

Mark DiFalco¹, Suzanne Gorovoy², Joseph Dzierzewski³, Girardin Jean-Louis⁴, Alicia Chung⁵, Azizi Seixas⁴, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Arizona College of Medicine, ³National Sleep Foundation, ⁴University of Miami, ⁵NYU School of Medicine

Introduction: There is limited population sleep data among teens from historically underserved groups. This study quantified differences in sleep health experiences across racial/ethnic groups.

Methods: Data were obtained from the National Sleep Foundation Sleep in America® Poll. The population-based sample (N=1,101) provided data on a range of sleep questions. Items included satisfaction with sleep overall, feeling refreshed, energy level, falling asleep, awakenings, WASO, weekday and weekend sleep duration, and ability to relax. Also, items assessed overall sleep quality, weekday and weekend sleep duration, bedtime, and wake-time, and days/week difficulty falling or staying asleep, sleepiness, taking sleep-promoting medications, and sleep impacting daytime functioning. Additional items probed for a sleep disorder diagnosis, talking to a doctor about sleep, perceived sleep need. Race/ethnicity was self-reported and categorized as Non-Hispanic White, Black/African-American, Hispanic/Latino, and Asian/Other. Regression analyses were population-weighted and adjusted for age, gender, and socioeconomics.

Results: Compared to Non-Hispanic Whites, Blacks/African-American teens were less likely to be "Very Dissatisfied" with sleep (RRR=0.28) and report their WASO as "Very Difficult" (RRR=0.19), reported 52.7 fewer minutes of weekend sleep, reported 0.61 additional days/week of sleepiness, were 56% less likely than Non-Hispanic Whites to discuss sleep with their doctor, and reported 25.3 fewer minutes of sleep need. Hispanic/Latino teens reported 0.35 fewer days/week taking sleep-promoting medications, were 62% less likely to be diagnosed with a sleep disorder and 62% less likely to talk to their doctor about sleep, compared to Non-Hispanic White teens.

Conclusion: Contextual factors that explain why teens from historically underserved groups reporting better sleep satisfaction, less sleep need, and being less likely to talk to their doctor about sleep, need to be explored. More research is needed into methods to promote sleep health equity in US teens.

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0302

ASSOCIATIONS BETWEEN OBJECTIVE AND SUBJECTIVE NEIGHBORHOOD FACTORS AND SLEEP AMONGST MIDDLE-AGED ADULTS IN THE HANDLS SLEEP STUDY

Adwoa Dadzie¹, Alexa Allan¹, Lindsay Master¹, Angel Collie², Orfeu Buxton¹, Alan Zonderman³, Michele Evans³, Alyssa Gamaldo⁴

¹Penn State University, ²University of Florida, ³National Institute on Ageing, National Institutes of Health, ⁴Clemson University

Introduction: Empirical evidence supports an association between poor neighborhood characteristics and poor sleep. However, limited studies have explored the influence of neighborhood factors in observed Black/White differences in actigraphic sleep and self-reported insomnia. We examined objective/ subjective neighborhood factors related to actigraphic sleep health and insomnia symptoms and the moderating role of race.

Methods: The sample (N=223) included adults (Mage=62; 67% Black race; 70% female, 64% above poverty threshold) enrolled in the Healthy Aging in Neighborhoods of Diversity across the Life Span Sleep (HANDLSleep) study. Subjective neighborhood quality was assessed using three neighborhood scales (i.e., perceived disorder, cohesion, and social control). Objective neighborhood quality was assessed with the Neighborhood Atlas Area Deprivation Index (ADI). Actigraphic sleep was assessed across 7 days and captured sleep onset, sleep onset variability, total sleep time (TST), wake after sleep onset (WASO) and sleep maintenance efficiency (SMEff). Insomnia symptom severity was assessed with the Insomnia Severity Index (ISI). Linear and logistic regression models were conducted to test the study aims and adjusted for demographic covariates (e.g., age, sex, and poverty status).

Results: Greater perceived neighborhood disorder was associated with greater actigraphic WASO (b=0.57, SE=0.19, p=.003) and less SMEff (b=-0.07, SE=0.03, p=.030), and an increased odds of insomnia symptom severity >=10 (OR=1.04, SE=0.02, p=.008). Higher perceived neighborhood social cohesion and social control was associated with less WASO (b=-1.11, SE=0.34, p=.001; b=-1.40, SE=0.46, p=.003) and greater SMEff (b=0.14, SE=0.06, p=.010; b=0.20, SE=0.08, p=.01) and a decreased odds of insomnia symptom severity (OR=0.93, SE = 0.02, p=.010; OR=0.91, SE=0.03, p=.010). Strictly among Black adults, higher neighborhood social control was significantly associated with a decreased odds of having an insomnia symptom severity >=10 (OR = 0.86, CI = 0.78-0.95). Strictly among White adults, residing in a more socioeconomically disadvantaged neighborhood was associated with an increased odds of having insomnia symptom severity >=10 (OR = 1.46, CI = 1.02-2.08).

Conclusion: These results demonstrate racial differences in associations between neighborhood characteristics and sleep, mechanisms of which should be further examined to strengthen the efficacy of mitigating sleep health issues. These findings motivate future research on altering neighborhood conditions to improve sleep health.

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0303

ASSOCIATIONS BETWEEN SOCIAL DETERMINANTS OF HEALTH AND LONG-TERM FITBIT-MEASURED SLEEP DURATION AND VARIABILITY IN THE ALL OF US RESEARCH PROGRAM

Esha Narla¹, May Baydoun¹, Dayna Johnson², Tené Lewis², Daniel Gottlieb³, Tianyi Huang¹

¹National Institute of Aging, ²Emory University, ³Harvard University

Introduction: Prior research on sleep and social determinants of health (SDOH) has largely relied on subjective sleep measures (primarily self-reported sleep duration) or short-term actigraphy recordings. Evidence remains limited on the associations between SDOH and objectively-assessed long-term sleep patterns in large-scale populations.

Methods: Our study included 13,282 participants from the All of US Research Program, who contributed at least 6 months of Fitbit data (mean 1247 days, range 181-4174). Mean sleep duration (in minutes) and sleep duration standard deviation (SD) across all available days were calculated from main sleep episodes, excluding days with sleep durations < 180 or > 840 minutes. SDOH measures, including social/community context (e.g., social support), economic stability, neighborhood and built environment, and healthcare access and quality, were derived from validated surveys. To facilitate comparisons, overall and domain-specific SDOH scores were standardized to z-scores. Associations between sleep metrics and SDOH (overall and by domains) were examined using multiple linear regression, adjusting for demographic, socioeconomic, and behavioral factors.

Results: The analytical sample had a mean age of 58.9 years (SD: 15.2); 70.3% were female, 84.2% were reported as white, and 59.6% were below the highest education category, with a mean sleep duration of 409.5 min (SD: 40.8). A 1-SD increase in the overall SDOH score, indicating more favorable social and structural conditions, was associated with 6.0 minutes (95% CI: 3.4, 8.7) longer sleep duration and 3.6 minutes (95% CI: -4.8, -2.4) lower sleep duration SD. Across individual domains, social/community context showed the strongest associations, with a 1-SD increase in the domain-specific score associated with 4.8 minutes (95% CI: 2.6, 7.0) longer sleep duration and 3.4 (95% CI: -4.4, -2.4) minutes lower sleep duration SD. Economic stability showed similar associations, while health and healthcare demonstrated slightly weaker associations ($p < 0.04$). No significant associations were observed for the neighborhood environment domain.

Conclusion: More favorable SDOH conditions, including social/community context, economic stability, and healthcare access, were associated with modestly longer and more regular sleep duration, emphasizing the importance of social context in sleep health. Ongoing analyses are investigating potential heterogeneity in these associations across age groups, sex, and race/ethnicity.

Support (if any): NIA Intramural Research Project ZIAAG000530

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0304

CAFFEINATED BEVERAGE INTAKE MODERATES THE RELATIONSHIP BETWEEN SLEEP QUALITY AND ALL-CAUSE MORTALITY IN THE SLEEP HEART HEALTH STUDY

Hesam Varpaei¹, Stuart Quan², Mathew Reeves¹, Pallav Deka³, Fabrice Mowbray¹, Dola Pathak¹, Lorraine Robbins¹

¹Michigan State University, ²Harvard Medical School, ³Wayne State University

Introduction: Accumulating data indicates that poor sleep quality is associated with increased mortality. However, it is unclear whether caffeine moderates the effect of sleep-quality on longevity. This study determined whether caffeine intake moderates the association between sleep-quality parameters and all-cause mortality in the Sleep Heart Health Study (SHHS).

Methods: From an initial cohort of 6,641 participants, 5,628 patients (mean age: 62.25±10.86 years) remained after excluding 134 individuals who withdrew consent and 679 with prevalent major adverse cardiac events at baseline (revascularization [n=169], myocardial infarction [n= 88], stroke [n=156], and congestive heart failure [n=166]). The final analytic sample was predominantly White/Caucasian (84.1%), slightly more than half were female (54.2%), and approximately one-third were classified as obese. Sleep measures were obtained using in-home polysomnography (PSG). Average caffeine intake computed as the mean number of cups of tea/coffee and cans of soda consumed per regular day and the night preceding the PSG was 1.62 ± 1.73. All-cause mortality was identified through follow-up interviews, annual questionnaires, and linkage with the Social Security Administration Death Master File (mortality rate = 19.7%). Binary logistic regression models were run for each sleep measure, adjusted for age and sex.

Results: Wake After Sleep Onset (WASO) was significantly associated with mortality ($\beta = 0.003$, 95% CI: 0.000-0.006), indicating that longer nocturnal wakefulness was linked to elevated mortality risk. Sleep efficiency showed a protective effect ($\beta = -0.015$ [-0.028 to -0.001]), suggesting that more consolidated sleep was associated with lower mortality. Sleep latency, Epworth Sleepiness Scale, and total sleep time did not exhibit significant independent associations with mortality. A significant negative interaction was observed between WASO and the highest intake category (≥ 6 cups/day) ($\beta = -0.011$ [-0.022 to -0.001]), indicating that the WASO-mortality association differed across caffeine groups. In contrast, sleep latency exhibited a positive interaction with ≥ 6 cups/day ($\beta = 0.018$ [0.001, 0.035]), suggesting heightened mortality risk at longer sleep latencies within this high-intake group.

Conclusion: Elevated WASO and prolonged sleep latency showed differential mortality risk across high-intake caffeine groups. These findings highlight the strategic importance of considering caffeine exposure when evaluating sleep-related predictors of long-term mortality.

Support (if any):

Abstract citation ID: z sag091.0305

0305

EVALUATING MULTIDIMENSIONAL SLEEP HEALTH IN WEST AFRICAN ADULTS*Jesujoba Olanrewaju, Leah Irish*

Department of Psychology, North Dakota State University

Introduction: Sleep research in Africa remains limited, with few studies using multidimensional assessments. Understanding sleep as a multidimensional construct is essential for identifying population-level sleep patterns and informing intervention strategies. This study examined multidimensional sleep health among adults in five West African countries and explored variations by key sociodemographic factors.

Methods: Adults (N = 245; Mean age = 24.2 years, SD = 6.0) from Ghana, Sierra Leone, Ivory Coast, The Gambia, and Liberia completed an online survey. Multidimensional sleep health was assessed using the RU-SATED questionnaire v4 (range: 0–24), measuring regularity, satisfaction, alertness, timing, efficiency, and duration. Characteristics of the sleep environment (physical comfort, temperature, noise, darkness) were measured using items from the Sleep Practices and Attitudes Questionnaire. Participants reported sex (55% male), settlement type (61% urban), and education (42% high school, 48% bachelor's degree, 8% postgraduate). Nocturnal sleep duration was self-reported. Descriptive statistics and mean comparisons examined sleep patterns across sociodemographic groups.

Results: Average overall sleep health was 12.2 (SD = 3.2), indicating moderate sleep health. Efficiency (M = 1.9, SD = 1.1) and duration (M = 2.0, SD = 1.1) showed the lowest scores. Timing (M = 2.0, SD = 1.1), alertness (M = 2.1, SD = 1.2), regularity (M = 2.0, SD = 0.9), and satisfaction (M = 2.2, SD = 1.0) were moderately rated. Sleep health varied little across sex (males: M = 12.3; females: M = 12.0), settlement type (rural: M = 12.3; urban: M = 12.1), or education (range: M = 11.3–12.4). Sleep environment characteristics were generally favorable (M = 3.1–4.2 on a 5-point scale). The average sleep duration was 6.1 hours (SD = 2.1).

Conclusion: This study provides initial evidence on multidimensional sleep health in West Africa, revealing moderate sleep health despite overall supportive sleep environments. Difficulties maintaining consistent, uninterrupted sleep and sleep duration emerged as key targets to consider for future intervention. Future research should examine how sociodemographic and broader biopsychosocial factors interact to shape sleep health in this understudied region.

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0306

GLUCOSE METABOLISM ASSOCIATED WITH SLEEP AND EATING BEHAVIOR AT THE US / MEXICO BORDER

Ruya Arce¹, Andrea Diaz-Pacheco¹, Elizabeth F. Rasmussen¹, Patricia Molina¹, Patricia Haynes¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Girardin Jean-Louis⁴, Azizi Seixas⁴, Debbie Chung⁴, Brittany Larsen⁴, Sadiya B. Ghani⁵, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Miami, ⁵Southern Arizona Veterans Affairs Health Care System

Introduction: Prior research studying border populations has shown that disrupted and insufficient sleep is linked to unhealthy eating patterns and poorer overall sleep quality, shaped in part by the sociocultural factors unique to this region. The present secondary analysis sought to examine the overlapping roles of sleep and eating behaviors on glucose metabolism in border-dwelling adults.

Methods: Data were collected from 992 working-age adults (age 25–60) living at the US-Mexico Border. Glucose metabolism was assessed using a point-of-care blood spot assay of hemoglobin A1c (A1c). Sleep variables included actigraphic (Mini-Motionlogger) and self-reported (Pittsburgh Sleep Quality Index) sleep duration, and insomnia symptoms (Insomnia Severity Index). Eating behavior was assessed with three-factor eating questionnaire, with 3 subscales: Cognitive Restraint (CR), Uncontrolled Eating (UE), and Emotional Eating (EE). Linear regression analyses adjusted for age, sex, and acculturation examined associations between A1c and both sleep (actigraphic and self-reported sleep duration and insomnia severity) and eating (CR, UE, EE). Forward stepwise analyses examined unique contributions of these 6 variables on A1c.

Results: Adjusted for covariates, shorter actigraphic sleep duration was associated with higher A1c (B = -0.08 / hour, p < 0.05), but self-reported sleep duration and insomnia were not associated with A1c. Greater UE was associated with higher A1c (B = 0.02, p < 0.05), as was greater EE (B = 0.05, p < 0.01), but CR was not. Greater UE was also associated with insomnia (B = 0.22, p < 0.0005), actigraphic (B = -1.05, p < 0.05) and self-reported (B = -2.28, p < 0.05) sleep duration; greater EE was associated with insomnia (B = 0.50, p < 0.0005) and both shorter actigraphic (B = -2.28, p < 0.05) and self-reported (B = -0.05, p < 0.05) sleep duration. CR was not associated with sleep variables. A forward stepwise model adjusted for covariates found that significant variance was explained by UE (B = 0.02, p < 0.05) and actigraphic sleep duration (B = -0.08, p < 0.05).

Conclusion: Although unhealthy eating patterns are also separately associated with sleep duration and quality, both Uncontrolled Eating and actigraphic short sleep duration are related to A1c likely via distinct pathways. Integrated, culturally informed interventions targeting both sleep and eating behaviors may hold promise for improving the metabolic health of adults at the U.S.-Mexico Border.

Support (if any): R01MD011600, R01MH135978

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0307

IMPROVING SLEEP LITERACY AND AWARENESS IN ASIAN AMERICANS THROUGH CULTURALLY-TAILORED EDUCATIONAL MATERIALS

Chenlu Gao¹, Ruixue Cai², Yifeng Lu³, Kun Hu², Lei Gao², Peng Li²

¹Massachusetts General Hospital, ²Massachusetts General Hospital and Harvard Medical School, ³Saint Vincent Hospital

Introduction: Asian Americans are the fastest-growing racial/ethnic group in the US, yet they face significant and under-recognized sleep health disparities, such as shorter sleep duration and under-diagnosis of sleep apnea. Culturally and linguistically appropriate sleep health education is an essential tool to address such disparities. We aim to develop, evaluate, and disseminate culturally

and linguistically tailored sleep health educational materials for Asian American communities.

Methods: Materials will initially be tailored for Chinese Americans and later adapted for other Asian groups. First, we will translate and culturally-tailor existing sleep health educational materials for three groups: (1) sleep hygiene education and sleep disorders screening tools for Asian American community members; (2) AASM patient guides for Asian American patients with sleep disorders; (3) knowledge about differential presentations of sleep disorders in Asians for healthcare providers who serve Asian American patients. Adaptations will consider culturally relevant factors and practices, such as napping practices and differential somatic symptom presentations of insomnia in Asians. Second, we will evaluate the clarity and cultural relevance of the initial materials by conducting focus groups (n=10 from each group; n=30 total). Third, we will recruit a pilot group (n=20 from each group; n=60 total) to assess the effectiveness of these materials in improving sleep health knowledge and attitudes. Final materials will be disseminated via community health centers and institutional websites.

Results: We anticipate that the culturally and linguistically adapted materials will be perceived as useful and relevant by the target populations. We also expect that these materials will lead to significant improvements in sleep literacy among community members, as well as better understanding of sleep disorders and treatment options among patients with sleep disorders. Moreover, we expect that the provider-facing materials will enhance providers' cultural competency regarding the unique presentations of sleep disorders in Asians.

Conclusion: This project will generate accessible and scalable resources to address the specific sleep health challenges faced by Asian Americans. The validated materials will also establish a foundation for future adaptations for other Asian American and minority communities, thereby improving sleep health literacy, access to sleep care, and sleep health equity.

Support (if any): AASM Community Sleep Health and Public Awareness Grant

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0308

INSUFFICIENT SLEEP ACROSS THE US: A COMPARATIVE ANALYSIS OF PLACE-BASED INDICES

Emily Feldman, Danica Slavish
University of North Texas

Introduction: The places people live, work, and socialize shape health across the lifespan. Climate change increasingly threatens population health through flooding, wildfires, and extreme weather events, all of which can contribute to injuries, displacement, chronic stress, and disruptions in healthcare delivery. Although vulnerability indices are widely used in public health and sleep research, few incorporate environmental or climate-related factors. This study compared six place-based vulnerability indices explain variation in insufficient sleep prevalence, with a specific focus on climate/environmental domains or indices.

Methods: Data from CDC PLACES was used to measure the relationship between insufficient sleep and Area Deprivation Index

[ADI], Childhood Opportunity Index [COI], Environmental Justice Index [EJI], Social Vulnerability Index [SVI], Heat and Health Index [HHI], Climate Vulnerability Index [CVI] scores across 3,131 U.S. counties and 67,974 census tracts (populations ≥ 50). Beta regression models included each index's component domains, with geography demographics (poverty, minority status, age ≥ 65 , uninsured) as reference. Pseudo R^2 compared variance explained nationally and across four Census regions.

Results: CVI demonstrated strongest associations with insufficient sleep (county pseudo $R^2 = 0.568$, tract = 0.537), even excluding baseline health domains (county = 0.538, tract = 0.523). ADI explained the least variance across all geographies (county = 0.179, tract = 0.234), performing particularly poorly in the West. The demographic reference model matched or outperformed most indices. Regional patterns varied substantially. Indices generally performed weakest in the West (tract and county) and the South (county only) and best in the Midwest.

Conclusion: Climate-related indices meaningfully explain differences in insufficient sleep beyond traditional measures (e.g., ADI). However, geographic scale and regional context influence index performance. Researchers should consider both when selecting vulnerability measures for sleep health research.

Support (if any):

Abstract citation ID: **zsag091.0309**

0309

LINKING SOCIAL, EMOTIONAL, STRUCTURAL, AND FINANCIAL DETERMINANTS OF HEALTH IN THE US POPULATION ASSOCIATED WITH SLEEP HEALTH USING MACHINE-LEARNING

Annie Chen¹, Azizi Seixas², Carolina Scaramutti², William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Miami

Introduction: Previous research has studied various determinants of health in relation to sleep health, but few leverage machine learning for parsimonious modeling to identify the most impactful predictors and corresponding trends.

Methods: Data from the 2022 Behavioral Risk Factor Surveillance System were used (N=193,225). Health determinants included availability of emotional support, social isolation, food insecurity, food stamps, housing insecurity, inability to pay utilities, employment insecurity, lack of transportation, household income, education, and employment status. Sleep duration was examined, with age, sex, race/ethnicity, and body mass index as covariates. Model building used LASSO to develop the most parsimonious model, followed by a generalized ordered logit model using the variables included in the LASSO model.

Results: A LASSO regression with EBIC selection was conducted while forcing in age, sex, and race/ethnicity as partialled covariates. The EBIC-optimal solution used $\lambda=345.32$. Variables with nonzero lasso coefficients included employment, education, income, housing, transportation, employment, and food insecurity, food stamps, utilities, emotional support, social isolation, and stress. The general logit model demonstrated a strong overall fit (Log-likelihood=-289,027.24, $p < 0.001$). Stress was consistently the strongest predictor (Rarely stressed: $\beta \approx 0.89$ -1.79; Never stressed: $\beta \approx 1.11$ -1.79), with higher stress consistently linked to

lower sleep duration. Worse emotional support strongly predicted lower sleep duration, particularly at lower cutpoints (Rarely supported: $\beta = -0.28$ to -0.34 ; Never supported: $\beta = -0.21$ to -0.44). Isolation showed opposite directional effects at different cutpoints; at low cutpoints, isolation predicted higher sleep duration but at high cutpoints it predicted less sleep. Hardships were consistently negative across thresholds (utilities insecurity: $\beta \approx -0.13$ to -0.20 ; transportation insecurity: $\beta \approx -0.05$ to -0.17 ; housing insecurity and food stamps: $\beta \approx -0.04$ to -0.06). Lower SES (lower income and education) predicted lower sleep duration in early thresholds and higher duration in upper thresholds, again requiring a generalized model. Non-Hispanic Whites had highest sleep duration; minority groups showed lower sleep across most thresholds.

Conclusion: Machine learning provides a way of identifying high impact targets for intervention. In addition to highlighting the importance of socioeconomic and structural factors for sleep health interventions, the model suggests that emotional factors such as stress may be the most impactful to address.

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0310

MULTIDIMENSIONAL SLEEP HEALTH DURING PREGNANCY: ASSOCIATIONS WITH RURALITY AND SOCIOECONOMIC STATUS

Brianne Nichols¹, Katrina Wilhite¹, Jaemyung Kim², Jacob Gallagher³, Alex Crisp², Christopher Kline⁴, Chooza Moon², Bethany Gibbs¹, Kara Whitaker²

¹West Virginia University, ²University of Iowa, ³Iowa State University, ⁴University of Pittsburgh

Introduction: Poor sleep health during pregnancy is associated with adverse pregnancy outcomes. Limited evidence suggests that rurality and low socioeconomic status (SES) are associated with poorer sleep health; however, these associations require more research in pregnant populations. This study aims to examine associations of rurality and SES with sleep health across pregnancy.

Methods: Data are from Pregnancy 24/7 Cohort Study (N=500). Most participants lived in urban areas (77.2%), had private insurance (83.5%), and were college educated (75.7%). Sleep was measured each trimester using device-based and self-reported methods (Actiwatch Spectrum Plus and Pittsburgh Sleep Quality Index [PSQI], respectively). Rurality was defined using Rural-Urban Commuting Area (RUCA) codes categorized as urban (1–3), micropolitan rural (4–6), and small town rural (7–10). SES was derived using latent class analysis of insurance, income, and education, with model fit statistics supporting three classes (low, mid, high). Sleep health outcomes were defined using the RU-SATED framework, including regularity, satisfaction, alertness, timing, efficiency, and duration and dichotomized using established cut-points. A composite RU-SATED score was created using dichotomized sleep health components, creating a scale of 0 to 6 (best). Generalized mixed-effects models assessed associations between SES and rurality with sleep health (RU-SATED and dichotomized components), adjusted for maternal age, pre-pregnancy BMI, and children in the home. Random effects accounted for repeated measures.

Results: After covariate adjustment, rurality was not significantly associated with individual sleep health components or the composite RU-SATED score, while SES showed multiple associations. For the composite RU-SATED score, a clear gradient emerged, with mid- and high-SES participants scoring 0.59 and 0.90 points higher than those in the lowest SES group (all $p < 0.001$). SES disparities were also evident across several individual components: mid- and high-SES groups had higher odds of ideal sleep regularity (OR: 2.60–5.66, 95% CI: 1.21–14.74) alertness (OR: 3.47–8.45, 95% CI: 1.28–39.42) timing (OR: 5.86–6.26, 95% CI: 2.09–25.16), and efficiency (OR: 4.39–12.39, 95% CI: 2.64–22.52). SES was not associated with sleep satisfaction or duration.

Conclusion: SES, not rurality, emerged as a determinant of sleep health, underscoring the need for additional research and strategies to support sleep health among low-SES pregnant individuals.

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0311

PSYCHOSOCIAL AND ENVIRONMENTAL DETERMINANTS OF OBJECTIVELY MEASURED INSUFFICIENT SLEEP AND CARDIOMETABOLIC RISK IN BLACK ADULTS: A MEDIATION ANALYSIS

Michelle Thompson¹, Zihao Wang², Jong Cheol Shin³, Diana Grigsby⁴, Anthony Briggs⁵, April Rogers⁶, Azizi Seixas⁷, Girardin Jean-Louis⁷

¹Lehigh University, ²University of Miami Miller School of Medicine, ³Department of Population Health, College of Health, Lehigh University, ⁴Brown University School of Public Health, ⁵Department of Neurology, NYU Langone Health, ⁶Collins College of Professional Studies in the Division of Health and Human Services at St. John's University, ⁷University of Miami

Introduction: Insufficient sleep (IS) is a well-established risk factor for adverse cardiometabolic outcomes that disproportionately affect Black Adults (BA). However, the extent to which psychosocial and neighborhood factors contribute to sleep duration among BA, and whether sleep duration helps explain cardiometabolic risk (CMR), remains unclear. We examined (1) associations of psychosocial and environmental determinants (PEDs) with CMR, (2) associations between PEDs and IS, and (3) whether IS mediates these relationships.

Methods: We analyzed cross-sectional data from 275 BA (73% female; Mage= 40.8, SD= 12.5 [range 18–75 years]) residing in New York and Miami from the NIH-funded ESSENTIAL study. Participants completed one week of home-based monitoring with the SleepImage Ring; nightly sleep duration was averaged to calculate IS. Psychosocial determinants included discrimination (Everyday Discrimination Scale), life stressors (Holmes and Rahe Stress Scale), social support (Multidimensional Scale of Perceived Social Support), and mental health (SF-12, history of anxiety/depression diagnosis). Environmental determinants included the Neighborhood Environment Walkability Scale (e.g., residential density, street connectivity), the Assessment of Sleep Environment, and neighborhood noise (SoundScore). CMR included a history of cardiometabolic risk diagnosis. Covariates included age, gender, education, employment, marital status, religious affiliation, income, and location. Unadjusted and adjusted linear and multivariable

regression models identified independent associations of PEDs with IS and CMR. Mediation analyses for key PEDs estimated the indirect or direct effects on CMR.

Results: In fully adjusted models, greater overall social support ($\beta = 0.20$, $p = 0.005$), higher residential density ($\beta = 0.0017$, $p = 0.012$) and greater street connectivity ($\beta = 0.33$, $p = 0.015$) were associated with longer sleep duration. Psychosocial and neighborhood factors exhibited modest associations with CMR. Across all exposure–outcome pairs, estimated indirect effects via sleep duration were small and not statistically significant.

Conclusion: Results suggest perceived social support and neighborhood environment were strongly associated with IS. However, objectively measured sleep duration did not mediate the associations between these factors and CMR. This suggests that pathways linking social and neighborhood context to CMR may operate largely through mechanisms other than IS, warranting the need for future longitudinal studies to explore these relationships further.

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0312

RUMINATION AND SLEEP: A GENDER-DIFFERENTIATED ANALYSIS

Samantha Hanus, Alisa Huskey, Samantha Jankowski, Kymerly Henderson-Arredondo, Michael Grandner, William Killgore
University of Arizona

Introduction: Chronic insomnia disorder (CID) is often accompanied by pre-sleep cognitive arousal, notably ruminative thought, which has been linked to poorer sleep quality by both objective and subjective sleep indicators. Rumination specifically has been consistently characterized as a cognitive symptom with a greater prevalence among women. We hypothesized that rumination would impact polysomnographic characteristics indicative of sleep quality more strongly in women than in men.

Methods: Twenty participants (nwomen=12, nmen=8) with insomnia symptoms completed 2 overnight in-lab stays to receive both an active and sham cTBS condition. Data for this abstract were extracted from the sham condition only (i.e., no intervention was administered). The Glasgow Content of Thoughts Inventory (GCTI) was administered at baseline and pre- and post-sham-stimulation assessments. For this data, GCTI scores closest to sleep (post-sham-stimulation) were used. Bivariate correlations were used to examine relationships between GCTI rumination scores and PSG sleep parameters in women and men separately. Parameters of sleep quality included sleep onset latency (SOL), N2 latency, and REM duration.

Results: In men, GCTI scores were not associated with PSG sleep parameters. In women, higher GCTI scores correlated with longer SOL ($r = 0.728$, $p = 0.007$.) and longer N2 latency ($r = 0.782$, $p = 0.003$.). No significant relationships were found between GCTI and REM duration in women.

Conclusion: Despite limited sample size, significant relationships were discovered between measures of pre-sleep rumination and PSG sleep parameters. Consistent with our hypothesis, pre-sleep mental activity was associated with difficulty falling asleep. Such cognitive activity may be disruptive to the early stages and overall stabilization of sleep, warranting further investigation into how this relationship fits into cognitive models of insomnia. Moreover, the association was only evident in women, suggesting that

sex-specific differences influence the way pre-sleep rumination affects sleep. However, this difference might be an artifact of small sample size; future work will be needed to evaluate this possibility. These results highlight the potential importance of considering a sex-stratified approach to understanding associations between cognitive factors and sleep difficulties.

Support (if any):

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0313

SLEEP PRACTICE PROFILES AND SLEEP DISTURBANCE IN CAREER FIREFIGHTERS

John Richmond Sy¹, Josh Barnum¹, Erin Rael¹, Dana Epstein², Michael Grandner¹, Daniel Taylor¹, Matthew Buman², David Glickenstein¹, Patricia Haynes¹

¹University of Arizona, ²Arizona State University

Introduction: Shiftworking firefighters often face chronic sleep disruptions, yet little is understood about how they manage these challenges. This study aims to examine how different sleep practice patterns relate to sleep disturbances among firefighters.

Methods: Career firefighters (N=290) working shift schedules from 20 fire agencies in Arizona were administered a survey as part of the Sleep Assistance for Firefighters (SAFFIRE) study. Demographics, occupational factors, sleep practices from the Sleep Practices and Attitudes Questionnaire, and sleep disturbance from PROMIS-Sleep Disturbance short-form (version 8b) were collected. An exploratory factor analysis was used to group similar sleep practices together. Next, a latent profile analysis classified firefighters into profiles based on shared sleep practice patterns. Finally, an ANCOVA compared mean sleep disturbance across profiles and firefighter rank while adjusting for years working nights and agency call volume.

Results: Results of the exploratory factor analysis grouped sleep practices into 1) staying in bed, 2) doing a productive activity (e.g., exercising, and doing chores), 3) doing a passive activity (e.g., listening to music, eating/drinking, and using a screened device), and 4) using alcohol and/or marijuana. The latent profile analysis then classified firefighters into Riser, Stay-in-Bed, and Substance-Use profiles. Mean sleep disturbance did not vary between profiles. However, firefighter rank ($F = 23.31$, $p < .001$, $\eta^2 = 0.08$) and its interaction with sleep practice profiles ($F = 3.57$, $p = 0.03$, $\eta^2 = 0.03$) were significantly associated with sleep disturbance.

Conclusion: Managers with the Riser and Stay-in-Bed profiles had significantly less disturbance compared to managers with the Substance-Use profile and non-managerial staff regardless of sleep practice profile. Future research needs to determine role-specific factors that contribute to differences in sleep disturbance between firefighter ranks.

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0314

SLEEP AND SELF-REGULATION RESOURCES IN LATINE ADULTS: AN EXPLORATION OF EFFECT MODIFICATION BY TRAUMA

Georgia Berry¹, Weijia Fan², Carmela Alcantara¹

¹Columbia University School of Social Work, ²Mailman School of Public Health

Introduction: Self-regulation is an important basic and multidimensional behavioral mechanism that is influenced by sleep. In experimental studies, conditions of acute sleep deprivation have been shown to negatively impact multiple dimensions of self-regulation (e.g., cognitive regulation, behavioral regulation, and emotion regulation). How these processes work in an ecological and real-world setting, and with marginalized populations, remains unknown. Emerging evidence suggests that trauma exposure may contribute to poor sleep outcomes and disrupt one's ability to self-regulate. Our aim was to examine the relationships between sleep and multiple dimensions of self-regulation (i.e., cognitive and behavioral self-regulation), and the extent to which these relationships were moderated by trauma in Latine adults.

Methods: We analyzed data from an intensive 40-day longitudinal study. Sleep duration and sleep efficiency were measured via wrist-actigraphy. Cognitive self-regulation was measured daily using an app-based Stroop Color-Word Interference test (Lumosity). Behavioral self-regulation was measured via self-report using a modified Brief Self-Control Scale, which assesses control over thoughts, emotions, impulses, and habits. Lifetime exposure to trauma was measured using the Life Events Checklist, and PTSD severity was measured using the Post-Traumatic Stress Disorder Checklist. We assessed the bi-directional association between sleep and self-regulation using lagged linear random-intercept models to estimate both within-person effects (person-centered) and between-person effects (person mean centered around overall mean) adjusting for covariates. For models with significant main effect, we further examined interactions between the primary predictor and trauma exposure or PTSD severity.

Results: Participants were 59 Latine adults free from sleep disorders (mean(SD): age 36.8(11.0), years of education 15.6(4.8); 69.5% women, 66.1% immigrant, and 37.3% Spanish-speaking). Higher than usual sleep efficiency predicted higher next day behavioral self-regulation score ($B=0.004$, 95% CI: 0, 0.009, $p<0.05$). Greater than 6 hours of sleep the previous night was associated with higher next day behavioral self-regulation score ($B=0.05$, 95% CI: 0.001, 0.105, $p<0.05$). There were no statistically significant interactions between trauma and efficiency or trauma and sleep duration.

Conclusion: We found a uni-directional relationship in which sleep duration and sleep efficiency were associated with next-day behavioral self-regulation. Our results highlight the importance of sleep health for effective behavioral self-regulation.

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0315

THE SOCIAL DRIVERS OF INSOMNIA AMONG ASIAN AMERICANS

Sunmin Lee¹, Brittany Morey¹, Yuxi Shi¹, Susan Redline², Suzanne Bertisch², Ichiro Kawachi³

¹University of California, Irvine, ²Brigham and Women's Hospital,

³Harvard Chan School of Public Health

Introduction: Although Asian Americans are one of the fastest growing populations in the United States, and they experience insomnia and sleep disparities, no study to date has illuminated the social drivers/determinants of insomnia for this group.

Methods: We used cross-sectional survey data from 779 Asian Americans (256 Chinese, 256 Korean, and 267 Vietnamese) ages 30 years and older living in Southern California. The Insomnia Severity Index (ISI) categorized participants into those with no clinically significant insomnia (0-7), subthreshold insomnia (8-14), and moderate/severe insomnia (≥ 15). Participants provided data on the social drivers of health (SDOH), including: age, gender, Asian ethnicity, marital status, education, household income, employment status, shift work, nativity, age at immigration, years lived in the US, English fluency, level of acculturation, and self-rated health. Using multinomial logistic regression, we examined associations between each SDOH and insomnia category for the total sample. We then repeated this analysis separately for men and women.

Results: Moderate/severe insomnia was present for 14.8% of the total sample. Women had twice the odds of moderate/severe insomnia compared to men (OR: 2.05, 95% CI: 1.33, 3.16). In the total sample, age, Asian ethnicity, age at immigration, years in the US, and English fluency were not associated with insomnia, but being divorced/separated/widowed was associated with greater odds of moderate/severe insomnia compared to being married (OR: 2.46, 95% CI: 1.51, 4.01). Higher education level, full-time employment, higher income, and better self-rated health were all associated with lower odds of insomnia in the total sample. For women, those ≥ 60 years-old had over 2 times the odds of moderate/severe insomnia compared to those < 45 years-old (OR: 2.19, 95% CI: 1.08, 4.43). Never married men had 3 times the odds of moderate/severe insomnia as married men (OR: 3.04, 95% CI: 1.30, 7.14). Higher education was more strongly protective against insomnia for women than for men.

Conclusion: SDOH, including marital and socioeconomic status, are associated with insomnia among Chinese, Korean, and Vietnamese Americans, and these associations differ in interesting ways for women and men. Future interventions among Asian Americans should consider upstream SDOH for addressing insomnia.

Support (if any):

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0316

USING SOCIAL LISTENING TO UNDERSTAND THE SLEEP LEXICON IN ONLINE PWS COMMUNITIES

Zachary Cline¹, Amee Revana², Aaron Chidekel³, Kimberly Renner³, Kerry Smallacombe³, Erin Cooper Carter⁴, Christopher DeFelice¹, Maria Picone¹

¹TREND Community, ²Texas Children's Hospital, ³Nemours Children's Hospital, ⁴Westside Behavioral Health

Introduction: Sleep disorders are among the possible health challenges people with Prader-Willi Syndrome (PWS) face. Social listening of online PWS discussion reveals patient/caregiver language around sleep issues and can highlight key concerns for intervention in this community.

Methods: We analyzed 226,333 documents (posts/comments) from Facebook groups devoted to PWS, mostly for caregivers of young children, and 3280 documents from reddit conversations mentioning PWS. A proprietary engine analyzed documents for mentions of clinical concepts and 14 daily living attributes,

including sleeping. Documents were lemmatized with spacy, and Term Frequency-Inverse Document Frequency (TF-IDF) was used to find words/phrases associated with subsets of documents. Vector semantics was used to determine phrases semantically similar to “sleepiness” and “narcolepsy”.

Results: The top sleep conditions were Sleep apnea (428 documents), Obstructive sleep apnea (376), Nightmares (146), Central sleep apnea (103), and Narcolepsy (81). TF-IDF revealed the following lemmatized words/phrases were associated with paragraphs about sleep that didn't mention a specific disease/symptom: “sleep study”, “nap”, “wake”, “night”, “day”, “sleepy”, “bed”, “fall asleep”, “start gh”, “growth hormone”, “sleep [a] lot”, “sleep sack”, “sleep through the night”, “pulse ox”. The most similar phrases to “narcolepsy” were “cataplexy”, “symptom”, “history”, “epilepsy”, “linked”, “associated”, and “neurological”. For “sleepiness”, the most similar phrases were “daytime sleepiness”, “fatigue”, “daytime”, “alertness”, “wakefulness”, “excessive”, “significant”, and “muscle tone”.

Conclusion: This analysis of over 229,000 community posts highlights sleep apnea as the most frequently discussed sleep issue in these online caregiver communities of young children with PWS, with sleep studies for starting growth hormone therapy seeming to drive much of that discussion. Narcolepsy also emerged as a key topic, with related terms like “cataplexy” and “daytime sleepiness” appearing in the discussions, suggesting an awareness of its potential connection to PWS. The use of social listening revealed a rich, nuanced vocabulary around sleep challenges in PWS that may be overlooked by traditional research methods, providing valuable insights into patient and caregiver experiences. By tapping into real-world conversations, social listening offers a unique opportunity to complement clinical data and better understand the lived realities of those affected by PWS, potentially guiding more targeted interventions and improving patient care.

Support (if any):

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0317

MICE LACKING THIOREDOXIN-INTERACTING PROTEIN HAVE REDUCED NON-RAPID-EYE MOVEMENT SLEEP AND SLOW-WAVE ACTIVITY RESPONSES TO TRAUMATIC BRAIN INJURIES

Sean Carey¹, John Craig², Mark Zielinski³

¹VA Boston Healthcare System, ²Boston VAMC, ³Boston VAMC and Harvard Medical School

Introduction: Traumatic brain injuries (TBIs) can induce oxidative stress and neuroinflammation, including nucleotide-binding domain, leucine-rich-containing family pyrin domain-containing 3 (NLRP3) inflammasome activation, and dysregulation of sleep and slow-wave activity. Under oxidative stress, thioredoxin-interacting protein (TXNIP) binds to and activates NLRP3, leading to the formation of the NLRP3 inflammasome complex. NLRP3 inflammasomes activate the somnogenic molecules interleukin-1 beta and interleukin-18 and are critical for regulating homeostatic non-rapid-eye movement sleep (NREMS) and slow-wave activity (SWA). We hypothesized that mice lacking TXNIP [TXNIP knockout (KO) mice] would have reduced NREMS and SWA responses to TBI.

Methods: Two-month-old male and female TXNIP KO and wild-type control mice underwent surgery for polysomnography, and baseline sleep and electroencephalogram (EEG) power analyses were performed for a 24-hour period. Thereafter, the mice were subjected to mild/moderate TBI in the frontal cortex using a controlled cortical impact device or underwent identical treatments without injury (i.e., SHAM). Sleep and EEG power analyses were conducted 24-36 hours and 2 months post-injury.

Results: No significant differences in baseline spontaneous NREMS, rapid eye movement sleep, or wake state amounts or EEG power spectra were found between TXNIP KO and control mice. TBI caused a significant enhancement in NREMS and SWA 24 h after the injury in wild-type mice when compared to baseline and SHAM controls, which was significantly attenuated in TXNIP KO mice. At the 2 months post-injury timepoint, significant increases in waking episode frequencies were found, indicating enhanced sleep fragmentation in wild-type but not TXNIP KO mice when compared to baseline values or SHAM mice. Significant reductions in NREMS and SWA were also observed in wild-type mice 2 months after TBIs compared to the baseline and SHAM groups, although these attenuations in NREMS and SWA were not found in TXNIP KO mice.

Conclusion: The results of this study suggest that oxidative stress from TBI partially activates TXNIP to dysregulate NREMS and SWA from TBIs. These findings also suggest that NLRP3 inflammasomes, which are dependent on TXNIP for activation, are involved in the NREMS and SWA responses to TBI.

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0318

THE EFFECT OF A 5-HT 2A/2C RECEPTOR ANTAGONIST PIMAVANSERIN ON SLEEP ARCHITECTURE IN MICE

Melanie Alexis Ruiz¹, Noah Williams¹, Dashdulam Davaanyam¹, Cole Winston¹, Junia de Deus¹, Haruka Hiyama², Ryuta Tamano², Lenise Kim³, Luigi Taranto-Montemurro³, Vsevolod Polotsky⁴

¹George Washington University, ²Shionogi & Co., Ltd., ³Apnimed, Inc., ⁴George Washington University School of Medicine and Health Sciences

Introduction: Serotonergic (5-hydroxytryptophan, 5-HT) neurons in the dorsal raphe nucleus have been implicated in mechanisms of sleep-wake regulation. The 5-HT_{2A/2C} receptor blocker pimavanserin has shown beneficial effects on sleep in patients with Parkinson's disease. However, the effect of pimavanserin on macro- and microstructure of sleep still requires further investigation. We aimed to examine the effect of pimavanserin on sleep architecture in C57BL/6J male mice.

Methods: We performed a randomized cross-over trial of a single dose of pimavanserin (3.0 mg/kg, subcutaneously) versus vehicle 1 week apart in adult C57BL/6 male mice (n = 17). Mice were instrumented with EEG/EMG headmounts. Polysomnography was performed from 10 am to 4 pm (light-phase) inside of a whole-body plethysmography chamber.

Results: Pimavanserin did not significantly affect NREM sleep time, but increased NREM bout duration from 0.60 ± 0.12 min

to 1.24 ± 0.51 min ($p = 0.0003$) and decreased the number of NREM sleep bouts from 133.6 ± 32.33 to 58.76 ± 40.13 ($p = 0.0004$). Pimavanserine increased the delta power in NREM sleep compared to vehicle ($p < 0.0001$). Sleep latency, total sleep time, wake after sleep onset (WASO), sleep efficiency, and the total arousal index remained unchanged with pimavanserine. Pimavanserine significantly suppressed REM sleep time from 11.03 ± 7.57 min to 2.57 ± 3.31 min ($p = 0.0010$). Pimavanserine also decreased the number of respiratory arousals from 4.62 ± 4.10 to 0.37 ± 1.06 events per hour ($n = 8$, $p = 0.01$).

Conclusion: Pimavanserine improved the quality of NREM sleep by consolidating sleep bouts, increasing the sleep depth, and suppressing respiratory arousals. Our data suggests that pimavanserine may help in alleviating conditions associated with sleep fragmentation, e.g. sleep-disordered breathing.

Support (if any): Shionogi-Apnimed Sleep Science

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0319

WAKEFULNESS, WELLNESS, & WORSHIP: A SYSTEMATIC REVIEW OF RAMADAN'S IMPACT ON SLEEP AND HEALTH IN MUSLIM ADOLESCENTS AND YOUNG ADULTS

Jasmine Niazi¹, Allan Heritage¹, Jonathan Miller¹, Linda Jones², Sabrina Atiq³, Halima Shaikh³, Eman Durrani⁴, Vaniza Atiq³

¹Lipscomb University, ²Belmont University, ³University of South Florida, ⁴Vanderbilt University

Introduction: Ramadan, a month-long period of daytime fasting observed by Muslims worldwide, is associated with delayed sleep onset, fragmented sleep, increased nighttime activity, and reduced total sleep duration, disrupting circadian rhythms and impacting health outcomes. However, there is a significant gap in the literature regarding Ramadan's impact on sleep health among Muslim adolescents and young adults. This systematic review synthesizes evidence from randomized controlled trials (RCTs) and quasi-experimental studies to examine changes in sleep and related health outcomes amongst Muslim adolescents and young adults during Ramadan. PROSPERO (CRD420251141599).

Methods: A systematic review was conducted using PubMed, Scopus, and PsycINFO to identify RCTs and quasi-experimental studies examining sleep outcomes among Muslim adolescents and young adults (ages 12–35) during Ramadan. Studies were included if they met the age criteria and assessed sleep using either subjective or objective measures. Two reviewers independently screened titles, abstracts, and full texts.

Results: A total of 12 studies met inclusion criteria ($N = 8$ quasi-experimental, 4 RCTs), which primarily examined sleep quality, sleep duration, alertness or daytime sleepiness, sleep timing, and sleep efficiency during Ramadan for Muslim adolescents and young adults. Sleep outcomes were evaluated using validated subjective instruments (e.g., PSQI, ESS, KSS, sleep diaries) and objective measures (e.g., polysomnography, multiple sleep latency testing, electroencephalography, actigraphy). Among the selected studies, Ramadan fasting was associated with reduced total sleep time, lower sleep efficiency, delayed sleep-wake schedules, increased daytime sleepiness, and poorer subjective sleep quality, alongside objective findings of reduced REM sleep and prolonged

slow-wave latency. Results further support how Ramadan fasting significantly alters sleep patterns among Muslim adolescents and young adults.

Conclusion: These findings highlight the clinical relevance of addressing sleep health during Ramadan and the need for targeted, culturally informed interventions. Future research should identify effective strategies for supporting sleep health and evaluate their cognitive, emotional, and physical impacts among Muslim adolescents and young adults.

Support (if any): N/A

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0320

RACIAL/ETHNIC DISPARITIES IN CIRCADIAN MISALIGNMENT AND CARDIAC AUTONOMIC MODULATION IN ADOLESCENTS

Natasha Morales-Ghinaglia¹, Susan Calhoun², Jason Liao³, Alexandros Vgontzas³, Duanping Liao³, Edward Bixler³, Julio Fernandez-Mendoza⁴

¹Geisinger Commonwealth School of Medicine, ²Penn State Health, ³Penn State College of Medicine, ⁴Penn State University, Hershey

Introduction: Prior studies have shown that circadian misalignment is associated with heart rate variability (HRV), an indicator of cardiac autonomic modulation (CAM), in adolescents. However, whether this association differs by race/ethnicity remains unclear. We hypothesize that, in addition to experiencing greater circadian misalignment and more blunted HRV, adolescents from racial/ethnic minority groups will exhibit a stronger association between circadian misalignment and blunted HRV compared to non-Hispanic White adolescents.

Methods: We analyzed 360 adolescents from the Penn State Child Cohort (median 16 years; 46% female; 21% racial/ethnic minority) with at least 3 nights of at-home actigraphy (ACT), in-lab 9-h polysomnography (PSG) and 24-h Holter-monitoring heart rate variability (HRV) data. Sleep midpoint (SM) was the intra-individual mean middle point of the sleep period. Sleep irregularity (SI) was the intra-individual standard deviation of SM. Social jetlag (SJL) was the absolute difference in SM between weekdays and weekends. Sleep duration (SD) was the intra-individual mean total sleep time. Sleep variability (SV) was the intra-individual standard deviation of SD. Primary HRV outcomes included frequency- and time-domain indices such as high-frequency oscillations (HF), standard deviation of normal-to-normal intervals (SDNN), and root mean square of successive differences (RMSSD). Race/ethnicity was self-reported and categorized as non-Hispanic White or racial/ethnic minority. Linear regression models stratified by race/ethnicity tested SM, SI, and SJL as predictors of HRV, adjusting for demographics, body mass index, SD, SV, AHI, and schooling.

Results: Minoritized adolescents showed significantly later SM ($p = 0.011$), greater SI ($p = 0.009$), and shorter SD ($p = 0.048$), as well as lower Log-LF ($p = 0.003$), SDNN ($p = 0.012$) and higher HR ($p = 0.027$) compared to non-Hispanic Whites. Among non-Hispanic White adolescents, those with a later SM had higher 24-h LF/HF ($p < 0.008$), lower 24-h Log-HF and RMSSD ($p < 0.045$), and lower nighttime Log-LF and SDNN ($p < 0.005$).

Conclusion: Minoritized adolescents sleep less, later, and more irregularly, and exhibit blunted HRV, indicating impaired CAM and increased vulnerability to cardiovascular disease. Circadian misalignment in non-Hispanic white adolescents is also associated with a similar degree of impaired CAM as minoritized adolescents. Future research should examine whether circadian interventions that reduce sleep health disparities can improve CAM.

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0321

EXAMINING THE IMPACT OF PRESENT-DAY REDLINING ON RACIAL AND ETHNIC DISPARITIES IN SLEEP AND CIRCADIAN HEALTH

Lauren Barber¹, Kierstin Faw², Dayna Johnson¹, Charlie Zhong², Sidney Donzella³, Lauren Teras², Alpa Patel², Lauren McCullough²
¹Emory University, ²American Cancer Society, ³University of Washington

Introduction: Structural racism is considered a fundamental determinant of racial and ethnic disparities in health, yet few studies have examined how structural racism impacts sleep and circadian health. We investigated the associations between present-day redlining, a marker of institutional racism, sleep, and circadian health.

Methods: The study population included men and women enrolled in 2006–2013 in the Cancer Prevention Study-3. Present-day redlining was calculated for census tracts using 2007–2013 Home Mortgage Disclosure Act data and linked to participants' geocoded address. In 2018, participants (N=111,863) self-reported their average sleep duration, sleep midpoint, social jetlag, sleep quality, and chronotype. Using linear and logistic regression models adjusted for sociodemographic factors, we estimated associations and 95% confidence intervals (CI) between redlining (redlined vs. non-redlined) and each sleep and circadian health dimension, overall and stratified by gender, race, and ethnicity.

Results: At baseline, the study population was 47.1 (SD=9.25) years old, 78.7% women, and majority White (92.4%). Overall, 29% lived in redlined census tracts, but the prevalence was higher among Black (59%) and Hispanic (34%) participants. On average, participants slept 7.9 hours, and 9.5%, 20.3%, and 35.8% had high social jetlag (>120 minutes), poor sleep quality, and an evening chronotype, respectively. Living in a redlined versus non-redlined census tract was associated with a modest increase in short (< 7 hours, odds ratio [OR]=1.06, 95% CI 1.02–1.10) and long (>9 hours, OR=1.05, 95% CI 1.00–1.10) sleep duration and poor sleep quality (OR=1.04, 95% CI 1.01–1.08). Present-day redlining was also associated with a 12% higher odds of high social jetlag (>120 vs. ≤120 minutes; OR=1.12, 95% CI 1.07–1.17), which was most pronounced among Black participants (OR=1.28, 95% CI 1.02–1.60; White: OR=1.12, 95% CI 1.07–1.17; Hispanic: OR=1.08, 95% CI 0.92–1.26). Redlining was not associated with sleep midpoint or chronotype, overall or in stratified analyses.

Conclusion: In this study, present-day redlining was associated with poor sleep health and some indicators of circadian health,

particularly high social jetlag. Given that minoritized populations are more likely to live in redlined areas, present-day redlining may contribute to observed disparities in sleep and circadian health.

Support (if any):

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0322

PSYCHOSOCIAL ADVERSITY IS A CONTRIBUTOR TO RACIAL DISPARITIES IN SLEEP HEALTH IN THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS (MESA)

Kaylin White, Shakira Suglia, Regine Haardoerfer, Tené Lewis, Ashley Naimi, Dayna Johnson
 Emory University

Introduction: Black Americans experience disproportionately poor sleep health, yet the mechanisms underlying these disparities remain incompletely understood. Psychosocial adversity throughout the life course including discrimination, chronic stress, and early life adversity (ELA) is linked to sleep health and may explain racial disparities in sleep. This study evaluated whether psychosocial adversities individually and cumulatively explained Black–White disparities in a composite measure of multidimensional sleep health in the Multi-Ethnic Study of Atherosclerosis (MESA).

Methods: We analyzed 1,391 Black and White adults from the MESA-Sleep Study (2010–2013). Sleep health scores (SHS) (range: 0–9) were derived from 7-day actigraphy and questionnaires. Psychosocial adversities included lifetime and everyday discrimination, chronic stress burden, and ELA. A cumulative lifetime adversity (CLA) score was created as the mean of percent-of-maximum-possible (POMP)-standardized domains (range: 0–100 index; higher scores indicate greater cumulative adversity). Counterfactual disparity measure (CDM) analyses with marginal structural models with inverse probability weighting estimated the proportion of the Black–White SHS disparity attributable to psychosocial adversities, individually and cumulatively. The CDM analyses compared the observed disparity with the disparity expected if adversity levels were set to a fixed values (none [0%] or average [≤17%]) for both racial groups.

Results: Black participants had lower SHS than White participants (mean [SD]: 4.6 [1.4] vs 5.6 [1.7]) and greater exposure to discrimination, chronic stress, and higher CLA scores. Discrimination and chronic stress burden were associated lower SHS after adjustment for sociodemographics, while ELA was not. CDM analyses indicated that individual psychosocial adversities did not explain Black–White disparities in SHS. In contrast, CLA accounted for 6.2% (95% CI: 2.2%, 11.0%) of the disparity when CLA was set to the overall sample average and 2.4% (95% CI: 0.0%, 4.0%) when adversity was set to none.

Conclusion: Cumulative psychosocial adversity, but not the individual components contributed to Black–White disparities in SHS. These findings highlight the contribution of clustering of multiple adversities across the life course to racial disparities in sleep. However, eliminating these disparities will require

addressing systematic determinants of sleep, including social and physical environmental conditions, alongside to strengthening resilience among populations most burdened by psychosocial adversity.

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0323

RACIAL AND ETHNIC DISPARITIES IN SLEEP HEALTH: AN UPDATED ANALYSIS

Michael Nguyen, Russell Whitehead, Michael Hutz
Rush University Medical Center

Introduction: Sleep plays a critical role in cardiometabolic, neurocognitive, and mental health. Racial and ethnic disparities have been documented across multiple sleep domains. This study provides an updated evaluation of racial/ethnic differences in sleep health using National Health Interview Survey (NHIS) data.

Methods: NHIS Sample Adult data (unweighted $N \approx 182,849$) from 2019–2024 was collected and binary sleep outcomes were analyzed. The primary exposure was race/ethnicity with sixteen covariates (e.g. demographic, socioeconomic, health behavior, and health status) included in survey-weighted logistic regression models for each outcome. Adjusted odds ratios (AORs) with 95% confidence intervals were estimated.

Results: The sample ($N=182,849$) was racially and ethnically diverse with mean age 47.8 years and 51.5% were female. After adjustment, Non-Hispanic Black (NHB) (AOR 0.65, 95% CI 0.61–0.70), Hispanic (0.92, 0.86–0.98), and Non-Hispanic Asian (NHA) (0.77, 0.70–0.85) adults had significantly lower odds of sufficient sleep compared with Non-Hispanic White (NHW) adults. NHB, Hispanic, and NHA adults were more likely to report feeling well rested than NHW adults (AOR 1.63, 95% CI 1.49–1.78; 1.77, 1.62–1.94; and 1.68, 1.50–1.89, respectively). All three groups also had lower odds of trouble staying asleep compared with NHW adults (NHB: AOR 0.74, 95% CI 0.69–0.79; Hispanic: 0.69, 0.64–0.74; NHA: 0.78, 0.71–0.85). Use of sleep medication was significantly lower across NHA, NHB, and Hispanic adults compared to NHW adults (AOR 0.64 [0.52–0.79], 0.65 [0.58–0.74], 0.76 [0.66–0.86], respectively).

Conclusion: In a racially and ethnically diverse population sample, NHA, NHB, and Hispanic adults experienced higher odds of insufficient sleep compared to NHW adults. All minority groups reported better subjective sleep quality (fewer insomnia symptoms, more frequent feeling rested) and were less likely to use sleep medications than NHW. These findings suggest that racial/ethnic sleep disparities are nuanced and minority groups may paradoxically report better sleep quality despite known risks for sleep shortfall, underscoring the need for culturally informed, race-specific sleep health interventions.

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0324

UNDERSTANDING SLEEP DISPARITIES: SOCIOECOLOGICAL INFLUENCES ON INSOMNIA AND TREATMENT PREFERENCES IN HISPANIC/LATINX ADULTS

Pablo Soto¹, Mayra Ramos¹, Natalie Dautovich¹, Rosalie Corona¹, Joseph Dzierzewski²

¹Virginia Commonwealth University, ²National Sleep Foundation

Introduction: Racial and ethnic disparities in sleep consistently demonstrate that minoritized populations experience poorer sleep compared to non-Hispanic White adults, a pattern evident in Hispanic/Latinx (H/L) individuals. Despite this, few studies have investigated the socioecological factors that shape sleep outcomes and treatment preferences in this population. The present study examined associations between socioecological factors, insomnia symptoms, and insomnia treatment preferences across the lifespan in H/L adults.

Methods: Participants were 1,072 self-identified H/L adults (63.3% female; Mean age=36.43 years) enrolled in the SIESTA (Sleep In Emerging-adults and Stress Response To Acculturation) study. Participants completed an online survey assessing cultural orientation (ARSMA-II), cultural values (MACVS), perceived discrimination (EDS), mental health (GAD-7 and PHQ-9), beliefs and attitudes about sleep (DBAS-16), insomnia symptoms (ISI), and insomnia treatment preferences (ITAS-B/M). Three hierarchical regression models were conducted, with individual-, social-, and societal-level predictors entered sequentially to evaluate their contributions to insomnia symptoms and to behavioral and pharmacological treatment preferences.

Results: All three hierarchical regression models revealed significant associations. The insomnia symptoms model explained 54% of the variance ($R^2 = .540$, $F(9, 1,062) = 138.73$, $p < .001$), with anxiety, depression, and dysfunctional sleep beliefs as significant predictors. The behavioral treatment model accounted for 24.2% of the variance ($R^2 = .242$, $F(9, 1,062) = 37.64$, $p < .001$), with dysfunctional sleep beliefs, acculturation, enculturation, familismo, and religiosity as significant predictors. The pharmacological treatment model accounted for 33.5% of the variance ($R^2 = .335$, $F(9, 1,062) = 59.58$, $p < .001$), with age, dysfunctional sleep beliefs, acculturation, familismo, and religiosity as significant predictors.

Conclusion: Findings underscore the importance of adopting a socioecological perspective to better understand sleep among H/L adults. Insomnia symptoms and treatment preferences were shaped by age, mental health, cultural orientation, and cultural values, highlighting the relevance of these factors. These results emphasize the need for sleep research and clinical care that integrate cultural and environmental influences. A broader socioecological approach may enhance the identification of sleep needs and support more effective, culturally responsive treatment planning for H/L adults.

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0325

CONTACTLESS SLEEP MONITORING TECHNOLOGY TO PREDICT ADVERSE BEHAVIORS IN AUTISMYashar Kiarashi¹, Conor Anderson², Ryan Lay², Jenny Foster², Johanna Lantz², Theresa Hamlin², Gari Clifford³¹Emory School of Medicine, ²The Center for Discovery, ³Georgia Institute of Technology

Introduction: More than 40% of people with Autism experience disrupted sleep, which is meaningfully higher than the general population. Poor sleep quality is linked to heightened adverse behaviors during wake. However, the ability to predict these behaviors based on overnight sleep patterns has been challenging, as it requires humans in the loop. Also, conventional monitoring approaches using wearable sensors may prove intolerable for those who experience sensory processing difficulties. We developed contactless systems and assessed whether we could successfully predict challenging daytime adverse behavior and whether those behaviors affect each other.

Methods: Over a span of 24 months, we deployed affordable infrared cameras and microphones in the bedrooms of 14 individuals with autism, aged 15 to 22. To ensure privacy, the system converted the video footage into aggregated motion statistics at the edge and Mel-frequency cepstral coefficients for audio. Then we uploaded only the extracted features. We analyzed more than 2,000 nights of data using the developed system to identify temporal patterns. Using machine learning models, we correlated overnight features with behavior labels that occurred the following day. The events were logged by the behaviorist-trained staff members. Such adverse events include aggression, self-injury, and disruption.

Results: Our model identified adverse behaviors in the morning with statistical significance ($p < 0.05$) for 7 of 14. Morning predictions' accuracy outperformed afternoon predictions (71% versus 54% balanced accuracy), showing sleep influence diminishes as the day progresses. The model differentiated between behavior types, accurately predicting aggression in 6 participants and self-injury in 3 participants. Next, we incorporated 7-days data, which led to a marginal benefit over single-night analysis. This shows the immediately preceding night carries primary predictive weight. Cohen's d effect size of 0.45 suggests moderate clinical utility for the responsive subgroup.

Conclusion: The off-body sensing pipeline offers a practical, non-invasive approach for sleep monitoring in Autism and has the potential for predicting daytime adverse behavior. Such an approach could enable care teams to preemptively modify environmental factors and therapeutic interventions based on objective overnight data and lead to enhancing behavioral outcomes.

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0326

DREAMS AS A DIMENSION OF SLEEP HEALTH: EXPANDING THE RU-SATED MODELEmily Feldman, Danica Slavish
University of North Texas

Introduction: The RU-SATED measure (Buysse, 2014) is a 6-item scale assessing sleep health dimensions: Regularity, Satisfaction,

Alertness, Timing, Efficiency, and Duration. This study aimed to (1) establish convergent and discriminant validity of the RU-SATED with established sleep measures, and (2) evaluate three candidate items to expand the scale to include dream health (RU-SATED-D). **Methods:** Undergraduate participants ($N = 501$; 67% female, 6% gender diverse; 44% White; M age = 19.35, $SD = 2.13$) completed the RU-SATED, three candidate dream items, nine established sleep/nightmare measures (Pittsburgh Sleep Quality Index, Insomnia Severity Index, Glasgow Sleep Appraisal Questionnaire, Epworth Sleepiness Scale, Medical Outcomes Study Sleep Scale, PROMIS Sleep Disturbance, Nightmare Distress Index, Disturbing Dreams and Nightmare Severity Index, Nightmare Severity Index), and the Alcohol Use Disorders Identification Test (AUDIT) for discriminant validity. Three candidate items assessing dream-related sleep disturbances were evaluated using exploratory factor analysis (EFA), with each item tested individually alongside the original 6 RU-SATED items, plus convergent validity with nightmare indices and incremental validity analyses.

Results: RU-SATED items showed strong convergent validity with sleep measures ($|r| = 0.11$ - 0.72 , $p < 0.05$) and weaker correlations with AUDIT ($r = -0.19$ to 0.00), supporting discriminant validity. Single-factor models for each candidate dream item demonstrated acceptable fit ($RMSEA = 0.036$ - 0.047 , $TLI = 0.953$ - 0.968), with factor loadings of 0.273 - 0.503 . All items showed strong convergent validity with nightmare measures ($r = 0.26$ - 0.45 , $p < 0.001$). The item "I sleep through the night without being awakened by dreams" displayed superior incremental validity across sleep outcomes ($\Delta R^2 = 0.012$ - 0.028 , $p < 0.05$).

Conclusion: RU-SATED demonstrated strong convergent and discriminant validity with established sleep measures. The expanded RU-SATED-D scale demonstrated strong psychometric properties, supporting dreams as a distinct component of sleep health warranting assessment.

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0327

RAPID SALIVARY MELATONIN MEASUREMENT USING AN APTAMER-BASED BIOSENSOR: TOWARD CLINICALLY FEASIBLE CIRCADIAN ASSESSMENTYanan Liu¹, Tianlang Ou², Qianhui Wei², Fang Han³, Feng Wei²¹Beth Israel Deaconess Medical Center, Harvard Medical School,²State Key Laboratory of Advanced Materials for Intelligent Sensing, GRINM Group Co., ³Peking University People's Hospital

Introduction: Melatonin is the principal hormonal marker of circadian phase, yet its clinical use is constrained by laboratory assays that require specialized equipment, slow processing, and limited sampling frequency. As circadian rhythm disorders increasingly require physiologic biomarker monitoring, rapid and minimally invasive melatonin measurement could broaden access to circadian assessment. This study evaluates an aptamer-based biosensing approach capable of detecting extremely low salivary melatonin concentrations and explores its translational potential for clinical workflows.

Methods: We employed a silicon-nanowire field-effect transistor (SiNW-FET) platform functionalized with a melatonin-specific aptamer. To improve probe orientation and target capture, a freeze-thaw assembly strategy was implemented to generate highly uniform aptamer monolayers. Analytical performance was

assessed using graded melatonin standards spanning physiological concentrations. To examine feasibility in clinical samples, untreated saliva from patients with sleep-wake rhythm disorders was collected at multiple time points and tested using the biosensor. Measurements were compared with mass-spectrometry values to assess agreement.

Results: The optimized aptamer assembly produced reproducible and stable sensor performance with high sensitivity across a physiologic concentration range, detecting melatonin at extremely low physiologic concentrations. The biosensor differentiated time-dependent melatonin changes in untreated saliva, demonstrating clear nocturnal rises and daytime nadirs consistent with expected circadian physiology. Signal trends closely matched those obtained from mass spectrometry, supporting analytical validity. Importantly, detection required less than two minutes per sample and no preprocessing, representing a substantial improvement in workflow efficiency. Specificity testing showed minimal cross-reactivity with common salivary proteins, indicating suitability for complex biological matrices. Together, these findings suggest that rapid point-of-care melatonin assessment may be feasible using this platform.

Conclusion: This aptamer-based biosensor enables ultrasensitive, rapid, and non-invasive salivary melatonin detection, providing a promising tool for clinical circadian evaluation. By supporting near-real-time biomarker monitoring without laboratory processing, the platform may complement traditional assays in assessing circadian phase, treatment response, and rhythm phenotype. Its portability and minimal sample needs highlight potential integration into sleep-medicine clinics and, ultimately, home-based circadian assessment.

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0328

LLM-DRIVEN MULTIMODAL SEQUENCE INTERPRETATION FOR HOME-BASED SLEEP AND RESPIRATORY ASSESSMENT USING FINGERTIP WEARABLE SIGNALS

Ting-An Shen¹, Hsin-Yu Chen², Cheng-Yao Chen³

¹PranaQ Pte. Ltd. Taiwan Branch (Singapore), ²PranaQ Pte. Ltd.,

³PranaQ, Co.

Introduction: Fingertip wearables enable continuous home monitoring of nocturnal physiology, including sleep, peripheral oxygen saturation (SpO₂), autonomic nervous system (ANS) activity, and apnea events. While each signal is informative, their clinical meaning emerges only when integrated, as sleep transitions, respiratory disturbances, and autonomic responses interact over short timescales. Conventional pipelines struggle to combine these heterogeneous signals. Large language model-driven agents can reason over complex multimodal patterns, synthesizing raw data into clinically meaningful assessments. This study evaluates whether multimodal sequence analysis combined with an LLM-

based diagnostic agent can produce robust, human-interpretable insights into sleep and respiratory function using data derived from the TipTraQ device.

Methods: Full-night time series were temporally aligned to preserve physiological synchrony. Sequence analysis characterized intra-channel structure and cross-channel coupling, revealing apnea-driven disruptions, delayed desaturation, ANS activation during sleep transitions, and fragmentation during hypoxemia. These sequences were then provided to a diagnostic agent built on an LLM. The agent was designed not merely to summarize individual metrics, but to reason about the temporal evolution and physiological interdependence of the signals. Rather than relying on rule-based logic, the agent interpreted the nightly sequences as a cohesive physiological narrative, producing structured, clinical-style assessments that integrated sleep quality, respiratory burden, autonomic reactivity, and oxygenation profiles.

Results: Across 124 nights, deep sleep coincided with autonomic stability and fewer apneas, while REM showed sympathetic activation. Apnea clusters often preceded SpO₂ declines, sleep transitions aligned with ANS shifts, and elevated ODI co-occurred with apnea and arousal bursts. The agent integrated these patterns into unified interpretations, associating desaturation with preceding instability and identifying sleep fragmentation as both contributor and consequence of respiratory burden.

Conclusion: This study shows multimodal sequence analysis of sleep, SpO₂, ANS, and apnea signals can support a diagnostic agent capable of high-level clinical reasoning. By recognizing temporal dependencies and cross-channel coupling, the agent transforms heterogeneous physiological sequences into cohesive assessments of sleep architecture, respiratory disturbance, hypoxemia risk, and autonomic regulation. The findings highlight the diagnostic agent—not merely the sensing hardware—as a central component of the system, enabling fingertip-based monitoring to serve as an interpretable, scalable alternative for home-based sleep evaluation and preliminary screening for sleep-disordered breathing.

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0329

PRE-SLEEP PHYSIOLOGICAL PATTERNS IDENTIFY RESPONDERS TO CLOSED-LOOP AUDITORY STIMULATION FOR SLEEP ENHANCEMENT

Yashar Kiarashi¹, Jonathan Berent², Mohsen Motie-shirazi³, Nelly Papalambros⁴, Qiao Li³, Andrew Stewart², Prabhjyot Saini¹, Daniela Grimaldi⁴, Kathryn Reid⁴, Phyllis Zee⁵, Ken Paller⁴, Allan Levey¹, Gari Clifford⁶

¹Emory School of Medicine, ²Nextsense Inc., ³Emory University,

⁴Northwestern University, ⁵Northwestern University Feinberg School of Medicine, ⁶Georgia Institute of Technology

Introduction: Closed-loop auditory stimulation is able to enhance slow wave activity (SWA) on the electroencephalogram (EEG), however individual responses can vary. We investigated whether pre-sleep physiological features could identify who benefits most from the stimulation and investigated relationships between stimulation responsiveness, sleep enhancement, and next-day cognitive performance.

Methods: Twenty-eight healthy adults (ages 19-40, mean 27 ± 5 years) experiencing mild sleep restriction underwent three visits, consisting of adaptation followed by randomized stimulation and sham nights. Pre-sleep resting EEG and HRV (8 minutes) were captured to establish baseline brain and cardiac activity before lights-off. During sleep, a phase-locked loop detected slow oscillations in the upstate and triggered 50-ms pink noise bursts for the first five hours. Word-pair recall and psychomotor vigilance task were administered at 1, 4, 7, and 10 hours post-wake. Machine learning models utilizing EEG spectral features and transfer learning from pre-trained sleep architectures were fine-tuned to predict responsiveness. The scores were calculated based on a leave-one-subject-out cross-validation approach.

Results: Auditory stimulation enhanced SWA in 26 out of 28 subjects. Pre-sleep alpha power positively correlated with SWA enhancement ($r=0.436$, $p < 0.01$), as did theta power ($r=0.329$, $p < 0.01$) and sleep onset latency ($r=0.429$, $p < 0.01$). Delta power showed negative associations ($r=-0.299$, $p=0.01$). Individuals with higher HRV, longer sleep onset, and who had less slow oscillation during sleep demonstrated more enhancement. Subject-level temporal embeddings from pre-sleep EEG predicted SWA responsiveness with 80% accuracy (AUC=0.93) and memory enhancement with 90% accuracy (AUC=0.92). Physiological responders showed trends toward improved memory retention at mid-day timepoints (4-7 hours post-wake, $p=0.07-0.08$) compared to non-responders. Also, our observations show that higher pre-sleep heart rate variability correlated with greater SWA enhancement and predicted better sustained attention at 7-10 hours post-wake.

Conclusion: Pre-sleep features reliably predict individual responsiveness to auditory stimulation and, to some degree, the associated cognitive benefits. Higher HRV, elevated alpha activity, prolonged sleep onset, and a lower number of slow oscillations indicate a greater enhancement of SWA. This helps to identify individuals who need and would benefit most from intervention.

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0330

UNDERSTANDING POSTPARTUM SLEEP: MUTUAL ASSOCIATIONS BETWEEN MATERNAL AND INFANT SLEEP

Immanuela-Nicole Enwesi, Elizabeth Hinckley, Lucia Ciciolla, Dian Yu
Oklahoma State University

Introduction: Maternal and infant sleep are closely interconnected in the early postpartum period, with infant nighttime behaviors known to disrupt maternal sleep continuity and maternal sleep patterns playing a role in caregiving responses. Although infant-to-maternal disruption is well recognized, fewer studies have examined mutual sleep associations using subjective daily measures. Understanding mother-infant sleep dynamics is important, as sleep fragmentation contributes to fatigue, mood disturbance, and caregiving strain in new mothers.

Methods: Participants included 16 mother-infant dyads from a longitudinal perinatal study. At 6 weeks postpartum, mothers

completed the Pittsburgh Sleep Quality Index (PSQI) to assess maternal sleep and the Infant Sleep Questionnaire (ISQ) to assess infant sleep behaviors. At 16 weeks, mothers completed daily sleep diaries for themselves and their infants across four consecutive days. Infant variables included average night waking frequency and average resettling duration. Maternal variables included diary-based total sleep time, daily perceived sleep quality, and PSQI global scores. Linear regressions tested infant-to-maternal and maternal-to-infant sleep associations, adjusting for the corresponding 6-week sleep variables as baseline covariates.

Results: The model predicting maternal total sleep time was significant ($R^2 = .55$, $F(3, 12) = 4.84$, $p = .019$). Infant resettling duration significantly predicted shorter maternal sleep ($b = 0.046$, $p = .012$; $\beta = .593$) and poorer baseline maternal sleep quality also predicted shorter sleep ($b = -0.33$, $p = .013$; $\beta = -.584$). Infant night wakings were not significant ($\beta = .005$). A model predicting average maternal sleep quality was also significant ($R^2 = .65$, $F(3, 12) = 7.34$, $p = .005$). Baseline PSQI predicted poorer 16-week sleep quality ($p = .0015$; $\beta = -.721$). Infant night wakings showed a trend toward poorer sleep ($p = .085$; $\beta = -.324$), while resettling duration was not significant ($\beta = .201$). Maternal-to-infant sleep models were not significant ($ps \geq .38$).

Conclusion: Findings highlight robust infant-to-maternal effects at 16 weeks postpartum. Infant nighttime regulation, particularly resettling duration, emerged as a key contributor to maternal sleep, whereas maternal sleep quality was shaped by baseline sleep patterns. Results underscore the importance of supporting infant nighttime regulation and resettling as a pathway to improving early postpartum sleep health.

Support (if any):

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0331

LEARNING BRAIN HEALTH FROM SLEEP: A GENERALIZABLE EEG BIOMARKER VALIDATED ACROSS DIVERSE COHORTS

Wolfgang Ganglberger¹, Haoqi Sun¹, Neils Turley¹, Ayush Tripathi¹, Peter Hadar², Aditya Gupta¹, Kaileigh Gallagher¹, Soriul Kim³, Samaneh Nasiri⁴, Yue Leng⁵, Emmanuel Mignot⁶, Chol Shin³, Sydney Cash², Robert Thomas¹, M. Brandon Westover¹

¹Beth Israel Deaconess Medical Center, ²Massachusetts General Hospital, ³Institute of Human Genomic Study, College of Medicine, Korea University, ⁴Emory University School of Medicine, ⁵University of California, San Francisco, ⁶Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: Sleep EEG encodes rich information about brain and systemic health, yet most predictive models rely on hand-engineered features. We developed an end-to-end deep learning framework that learns a data-driven latent representation of overnight EEG and derives a single "brain health score." We evaluated performance across three large population cohorts and conducted a fully independent external validation in a BIDMC clinical sample.

Methods: We analyzed 36,000 PSGs from six cohorts (FHS, MESA, MrOS, SOF, KoGES, MGH) to train a multi-task model using the C4-M1 EEG channel as 1D time series and 2D spectrograms. The encoder generated a 1024-dimensional latent space; downstream

heads predicted cognitive test scores (e.g., fluid and crystallized intelligence), disease status (e.g. dementia, major depression), and a distilled brain health score. Training used cross-validated splits with strict subject-level separation. Independent evaluation included: (1) held-out population cohorts and (2) a new BIDMC clinical cohort ($N \approx 6,483$) containing all-cause mortality information. Performance metrics included correlation for cognition, ROC-AUC for disease, and Cox models for mortality.

Results: Across cross-validated training cohorts, the deep learning-derived score outperformed demographic baselines and classical machine-learning models using expert-defined EEG features. Cognitive correlations reached $R \approx 0.35$ – 0.40 ; disease classification AUCs ranged 0.65–0.75. In mortality analyses (MrOS, MGH), each SD increase in the score predicted 31–35% lower hazard (HR 0.65–0.69, $p < 0.0001$). In the independent BIDMC validation cohort, the score generalized without retraining; a 1-SD increase predicted a 24% lower age-adjusted mortality rate ($p < 0.0001$). Effect sizes were comparable to or exceeded those observed in development cohorts, demonstrating transportability to real-world clinical EEG.

Conclusion: A single overnight EEG, analyzed via end-to-end deep learning, yields a generalizable biomarker of brain health that predicts cognition, disease risk, and mortality across diverse populations. Independent validation at BIDMC confirms performance in a clinically heterogeneous setting, supporting its potential for scalable deployment in research and clinical practice.

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0332

REDUCED TISSUE IL-10 IN OBSTRUCTIVE SLEEP APNEA IS LINKED TO IMPAIRED INSULIN SIGNALING

Mohammad Badran¹, David Gozal²

¹University of Missouri, ²Marshall University

Introduction: Obstructive sleep apnea (OSA) drives cardiometabolic disease in part through chronic, low-grade inflammation. While circulating interleukin-10 (IL-10) findings in OSA have been inconsistent, we hypothesized that local anti-inflammatory capacity is diminished at the tissue level, thereby sustaining systemic inflammation and metabolic dysfunction. We therefore examined whether IL-10 is reduced in human OSA tissues despite equivocal plasma data, and tested whether exogenous IL-10 can directly improve insulin signaling in human adipose cells, supporting a translational anti-inflammatory strategy.

Methods: We partnered with the MU OneHealth Biorepository to obtain adipose and colon tissues from adults with and without OSA. Tissues were homogenized and IL-10 concentrations quantified using a high-sensitivity ELISA (Human IL-10 Quantikine HS, R&D HS100C). Fresh OSA adipose tissue was used to isolate the stromal vascular fraction (SVF). Purified SVF was pre-treated with recombinant human IL-10 (10 ng/mL, 4 h) or vehicle and then applied to matched donor adipocytes $\pm$ exogenous insulin. Insulin pathway activation was assessed by p-Akt (Ser473) immunoblots and normalized to total Akt.

Results: IL-10 levels were significantly lower in OSA adipose tissue ($\sim 35\%$ reduction; 1.25 ± 0.05 vs 1.93 ± 0.78 pg/mg; $p \approx 0.04$; $n = 5$ – 6) and showed a pronounced decrease in OSA colon ($\sim 58\%$ reduction; 3.86 ± 1.8 vs 9.24 ± 4.58 pg/mg; $p = 0.057$; $n = 5$) relative to non-OSA controls. In preliminary functional assays from two independent OSA adipose samples, IL-10-conditioned SVF augmented adipocyte insulin signaling compared with vehicle, with p-Akt/Akt ratios of 1.54 ± 0.22 vs 1.07 ± 0.21 , respectively, following insulin stimulation, consistent with partial restoration of insulin pathway responsiveness.

Conclusion: Tissue IL-10 is reduced in adipose and colonic samples from OSA patients, indicating a localized anti-inflammatory deficit that may underlie heightened cardiometabolic risk. Exogenous IL-10 enhances insulin signaling in primary human adipose preparations from OSA donors, supporting IL-10-based or IL-10-inducing interventions as potential adjuncts to CPAP to mitigate OSA-related metabolic dysfunction.

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0333

STYLOPHARYNGEUS AND PHARYNGEAL NERVE TRANSECTIONS EXHIBIT FLATNESS AIRFLOW PATTERN IN CONSCIOUS RATS

Eriko Hamada¹, Kingman Strohl², Cara Campanaro³, Isabella Hsieh⁴, Thomaz Fleury⁵, Denise Dewald⁶, Yee-Hsee Hsieh³

¹Division of Pulmonary, Critical Care, and Sleep Medicine, University Hospitals, Case Western Reserve University,

²University Hospitals / Case Western Reserve University, ³Case Western Reserve University, ⁴Northwestern University,

⁵Department of Otolaryngology-Head and Neck Surgery, University Hospitals, Case Western Reserve University,

⁶MetroHealth Medical Center

Introduction: The Guilleminault “tent hypothesis” (1978) proposed the coordinated action of stylopharyngeus and pharyngeal constrictor muscles in humans maintain upper airway patency. We previously demonstrated that bilateral transection of the stylopharyngeus muscles (upper airway dilator muscles) caused flattening of the inspiratory waveform flow in conscious rats consistent with inspiratory flow limitation. Here, we quantify the duration of the inspiratory flattening after bilateral stylopharyngeus transection and test the resilience of the system by additionally transecting the pharyngeal branch of the vagus nerve (Ph-X), innervating the pharyngeal constrictor muscles.

Methods: Adult male Sprague-Dawley rats underwent one of three procedures: 1) Bilateral stylopharyngeus transection (BST, $n = 10$), 2) Bilateral transection of stylopharyngeus and Ph-X (BST+BTPB, $n = 3$), 3) Sham surgery ($n = 3$). Respiratory flow was acquired using whole-body plethysmography (3–5 hours/session). Fifty stable breaths were analyzed at baseline and postoperative days (PD) 1, 3, 5, and 7. Median of inspiratory time (TI), duration of flatness (Flat), and the Flat/TI ratio were calculated. Statistical analysis used the Wilcoxon signed-rank test and Mann-Whitney U test.

Results: BST group vs sham group showed significant differences compared to baseline on PD1 in TI (sham -0.02 s, BST 0.08 s, $p = 0.049$), Flat (sham 0 s, BST 0.09 s, $p = 0.014$), and Flat/TI (sham 0 s,

BST 0.29s, $p = 0.014$). Compared to baseline, the BST group showed significant differences in TI (Baseline 0.23s, PD1 0.29s, $p = 0.002$), PD5 (0.25s, $p = 0.037$), and PD7 (0.25s, $p = 0.002$), Flat on PD7 (Baseline 0.03 s, PD7 0.20s, $p = 0.002$) and Flat/TI on PD1 (Baseline 0.15s, PD1 0.44s, $p = 0.002$). BST group vs BST+BTPB group showed significant differences in Flat (BST 0.01s, BST+BTPB 0.09s, $p = 0.014$) and Flat/TI on PD7 (0.26s, $p = 0.014$).

Conclusion: Bi-Stylopharyngeus transections alone increased Flat/TI recovered by PD7. Combined BST+BTPB group persisted the effect to PD7. Sham control did not show difference. In this model system, both dilator and constrictor pathways are needed to preserve inspiratory flow.

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0334

VITAMIN D SUPPLEMENT INTAKE LINKED TO INCREASED TIME SPENT IN THE REM DREAM-STAGE IN PERSONS WITH SLEEP DISTURBANCE AND MILD COGNITIVE IMPAIRMENT

Sirui Zhou, Victoria Pak
Emory University

Introduction: Understanding how vitamin D supplementation relates to rapid eye movement (REM) sleep is important as both sleep disturbance and vitamin D deficiency is common in individuals with mild cognitive impairment (MCI) and may contribute to cognitive decline. Although some studies suggest that Vitamin D may improve sleep quality, findings are mixed. Vitamin D supplementation's effects on specific sleep architecture measures—particularly REM sleep, which is critical for memory consolidation, are not well understood. This study explored associations between vitamin D supplement intake and time spent in REM sleep among individuals with MCI and sleep disturbance.

Methods: This cross-sectional study included 36 participants with diagnosed or suspected MCI and symptoms of disturbed sleep (as identified by the Epworth Sleepiness Scale and/or Pittsburgh Sleep Quality Index). Vitamin D supplement intake was assessed using a modified Food Frequency Questionnaire (FFQ). Time spent in REM sleep was collected using an at-home polysomnography device (Sleep Profiler) and was averaged over two days. A multiple linear regression model examined the association between vitamin D supplement intake and minutes spent in REM sleep, controlling for baseline covariates of age, sex, body mass index (BMI), race, and history of hypertension.

Results: Participants had a mean age of 67.6 years ($SD=1.5$), a mean BMI of 28.8 ($SD=7.1$), 36.1% were male, and 33.3% with a history of hypertension. Daily Vitamin D supplements in the dosage range of 2000-4999 IU showed a significant increase in time spent in REM (estimate (SE) = 49.2 (22.1); $p = 0.036$).

Conclusion: To our knowledge, this is the first study to evaluate the relationship between daily vitamin D supplement intake and

time spent in REM sleep in individuals with sleep disturbance and MCI. We found that moderate-dose vitamin D supplementation was associated with longer time spent in REM sleep in this population.

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0335

INTERACTION OF SLEEP AND CIRCADIAN RHYTHMS OF AUTISM RISK GENES ACROSS HUMAN BRAIN CELL TYPES AND DROSOPHILA

Daniel Rosoff¹, Greg Wesseling², Bridget Lear³, Shiju Sisobhan², David Ray¹, Ravi Allada²

¹University of Oxford, ²University of Michigan, ³Northwestern University

Introduction: Sleep and circadian disturbances are highly prevalent in autism spectrum disorder (ASD), yet the mechanisms linking ASD risk genes to human sleep/circadian physiology remain unclear. Advances in single-cell expression quantitative trait loci (eQTL) datasets now enable testing of gene and cell-type-specific relationships with sleep traits.

Methods: We intersected the SPARK/ClinGen list of 162 ASD risk genes with cell-type-specific cis-eQTLs ($N=983$), yielding 111 genes with suitable instruments across seven brain cell types and 24 neuronal and glial sub-classes. These cis-eQTLs were used as expression proxies in a drug-target Mendelian randomization (DTMR) framework to estimate causal relationships with UK Biobank sleep traits (chronotype, sleep duration, ease of getting up, snoring; $N \leq 413,343$) under multiple-testing correction. To further prioritize ASD sleep-circadian genes, we triangulated DTMR findings with (i) postmortem human dorsolateral prefrontal cortex (dlPFC) time-series transcriptomics, and (ii) *Drosophila* RNAi circadian phenotyping.

Results: Across sleep outcomes, 12 ASD risk genes exhibited Bonferroni-significant, cell-type-specific relationships, primarily for chronotype (11 genes) and ease of getting up (5 genes). BCL11A showed concordant and opposite-direction chronotype associations across excitatory neurons, interneurons, and oligodendrocyte progenitors. RELN demonstrated robust chronotype associations across five neuronal and glial subclasses, strongest in interneurons. MEF2C displayed large chronotype relationships in homeostatic microglia and opposite-direction getting-up effects in activated microglia. Several Bonferroni- or FDR-significant genes (ACTB, EHMT1, DNMT3A, SETBP1, SHANK2, MAGEL2, IRF2BPL, CACNA1C, MEIS2) also displayed rhythmic or clock-regulated expression in dlPFC cell types, supporting conserved circadian roles. Further, *Drosophila* homologs of ASD genes such as NBEA, PHF3, PSMD12, and RERE produced canonical circadian phenotypes with complementary human MR associations. Although no ASD gene was implicated across all three systems, several showed convergent evidence across human genetics, brain circadian regulation, and *Drosophila* screening.

Conclusion: Integrating human genetic, transcriptomic, and cross-species functional evidence reveals that ASD risk genes exert cell-type-specific impact on human sleep and circadian traits, especially chronotype, highlighting conserved molecular pathways linking ASD genetics to sleep-circadian biology.

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0336

PIMAVANSERIN ALTERS BASELINE VENTILATION AND HYPERCAPNIC CHEMOREFLEX IN MICE

Dashdulam Davaanyam¹, Noah Williams¹, Melanie Alexis Ruiz¹, Haruka Hiyama², Ryuta Tamano², Luigi Taranto-Montemurro³, Lenise Kim³, Vsevolod Polotsky⁴

¹George Washington University, ²Shionogi & Co., Ltd., ³Apnimed, Inc., ⁴George Washington University School of Medicine and Health Sciences

Introduction: Hypercapnic ventilatory response (HCVR) is a key driver of the respiratory control. Serotonin (5-hydroxytryptophan, 5-HT) plays an important role in central chemoreception. The depressed HCVR leads to hypoventilation, whereas overly robust HCVR increases loop gain and contributes to central and obstructive sleep apnea. CO₂ is also a key stimulus inducing respiratory arousals from sleep, and mechanisms of respiratory arousals are also orchestrated by 5-HT signaling. We investigated whether pharmacological antagonism of serotonergic 5-HT_{2A/2C} receptors with pimavanserin alters baseline ventilation and HCVR during wakefulness, and CO₂-induced arousal threshold during sleep

Methods: We conducted a randomized cross-over study of a single dose of Pimavanserin (3 mg/kg, subcutaneously) versus vehicle one week apart in adult male C57BL/6 mice. Mice were instrumented with EEG/EMG head mounts and underwent assessments of HCVR (n = 18) and CO₂-induced arousal threshold (n = 11). Tidal volume (VT), respiratory rate (RR), and minute ventilation (VE) were measured, and HCVR was determined by the slope of VE versus inspired CO₂ (0 - 8%) using linear least-squares regression analysis. The arousal threshold was determined by arousal latency from stable NREM sleep to the hypercapnic challenge (8% CO₂).

Results: Pimavanserin increased room air VE during quiet wakefulness compared to vehicle (1.1±0.06 vs 1.5±0.07 mL/min/g, p=0.0001) by elevating both VT (0.19±0.01 vs 0.2±0.01 mL, p=0.03) and RR (164.3±4.6 vs 187.7±4.9 bpm, p=0.001). In contrast, during hypercapnia, pimavanserin significantly decreased VT (0.39±0.01 vs 0.34±0.01 mL, p=0.005) and VE (4.8±0.17 vs 4.2±0.16 mL/min/g, p=0.01), which resulted in the HCVR suppression (0.46±0.02 vs 0.33±0.03 ΔmL/min/Δ%CO₂/g, p=0.003). In our set-up, arousal latency to hypercapnia was not altered (17.02±2.0 vs 13.9±1.3 sec, p=0.17).

Conclusion: Pimavanserin increases baseline ventilation and suppresses hypercapnic chemoreflex during wakefulness. Our findings suggest that pimavanserin may be helpful in patients with overly robust hypercapnic chemoreflex, which may support the

role of 5-HT_{2A/2C} receptors in loop gain regulation. Surprisingly, 5-HT_{2A/2C} antagonism did not significantly affect arousal latency to hypercapnia as shown in previous studies. The role of 5-HT_{2A/2C} receptors in the regulation of respiratory arousal threshold needs to be further investigated.

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0337

THE EFFECT OF A 5-HT_{2A/2C} RECEPTOR ANTAGONIST ON BREATHING DURING SLEEP IN MICE

Noah Williams¹, Mi Kyung Shin¹, Dashdulam Davaanyam¹, Cole Winston¹, Junia de Deus¹, Haruka Hiyama², Ryuta Tamano², Lenise Kim³, Luigi Taranto-Montemurro³, Vsevolod Polotsky⁴

¹George Washington University, ²Shionogi & Co., Ltd., ³Apnimed, Inc., ⁴George Washington University School of Medicine and Health Sciences

Introduction: Obstructive sleep apnea (OSA) is characterized by recurrent upper airway obstruction during sleep due to the loss of pharyngeal muscle tone. Serotonergic pathways, particularly 5-HT_{2A/2C} receptors, play a role in modulating respiratory and upper airway motor control. We aimed to evaluate the effects of the 5-HT_{2A/2C} antagonist pimavanserin on breathing parameters during sleep and upper airway muscle activity in mice.

Methods: We conducted a randomized cross-over study of a single dose of Pimavanserin (3 mg/kg, subcutaneously) versus vehicle in adult C57BL/6 male mice for respiratory recordings (n=8) and genioglossus (GG EMG) activity (n=12,14) from 10AM to 4PM. Mice were headmounted with EEG and EMG electrodes and recorded in whole-body plethysmography chambers. Respiratory recordings were analyzed using a respiratory analysis algorithm in MATLAB. GG EMG during sleep was normalized to quiet wakefulness.

Results: During NREM sleep, pimavanserin augmented minute ventilation compared to vehicle from 0.89 ± 0.20 mL/min to 1.18 ± 0.23 mL/min (n=8, p=0.06) due to an increase in respiratory rate from 153 ± 21 to 176 ± 12.8 breaths per minute (n=8, p=0.02). In NREM sleep, there was a trend to increase inspiratory flow limitation after pimavanserin from 0.74% ± 2.47% to 6.28% ± 7.44% of breaths (n=8, p=0.08). Pimavanserin greatly decreased the number of apneas from 12.3 ± 40.9 to 0.00 ± 0.38 events per hour (n=8, p=0.02). Pimavanserin showed no effect on respiratory parameters during REM sleep, however the data was inconclusive due to REM sleep suppression. Pimavanserin did not significantly affect GG EMG activity during NREM sleep, with 0.75 ± 0.14 normalized units after vehicle and 0.78 ± 0.22 after pimavanserin (n=14, p=0.52). Finally, pimavanserin showed a trend to increase GG EMG activity in REM sleep from 0.31 ± 0.15 to 0.40 ± 0.17 normalized units (n=12, p= 0.08).

Conclusion: Pimavanserin stimulated breathing during NREM sleep and abolished apneas while GG EMG was not significantly affected. Taken together, our data suggest that 5-HT_{2A/2C} blockers may contribute to pharmacotherapy of sleep disordered breathing.

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0338

EVALUATING PROPOFOL-INDUCED CHANGES IN SLEEP SPINDLE DENSITY IN LATE-LIFE TREATMENT-RESISTANT DEPRESSION

Jay Patel¹, Nathaniel Gunter², Robby Greenspan¹, Millie Gyawali², Brendan Lucey³, Charles Reynolds⁴, Eric Lenze¹, Ben Julian Palanca¹

¹Washington University School of Medicine, ²Washington University in St. Louis, ³Department of Neurology, School of Medicine, Washington University in St. Louis, ⁴University of Pittsburgh School of Medicine

Introduction: Sleep spindles are brief thalamocortical oscillations and markers of stage N2 sleep, which play a key role in maintaining sleep stability and supporting synaptic plasticity. Aging and neuropsychiatric illness are associated with reduced spindle expression. Propofol, a GABA-ergic anesthetic, induces spindle-like oscillations and slow-wave dynamics, suggesting potential modulation of these circuits. The SWIPED I trial (ClinicalTrials.gov NCT04680910) leveraged propofol as a mechanistic probe to enhance slow-wave expression in adults with late-life treatment-resistant depression (LL-TRD). We examined whether propofol modulated changes in spindle density and whether these changes were related to antidepressant effects.

Methods: Fifteen adults aged ≥ 60 years with treatment-resistant depression received two propofol infusions titrated to maximize slow-wave expression. Overnight polysomnography was

conducted at baseline and the night of each infusion. Sleep spindles were quantified from stage N2 sleep using the personalized semi-automatic spindle detection (PSASD) algorithm, using baseline and infusion-night recordings. Spindle density was calculated as spindles per minute of N2 sleep. Depressive symptom severity was assessed at baseline, one, three, and ten weeks post-infusion via the Montgomery-Åsberg Depression Rating Scale (MADRS).

Results: Total propofol dose correlated with increases from baseline in N2 sleep spindle density on post-infusion nights ($r = 0.62$, $p = 0.015$). Other spindle characteristics (frequency, peak-to-peak amplitude, and duration) did not change (all $p > 0.05$). Increased spindle density correlated with reductions in depressive severity at 1 week ($r = -0.61$, $p = 0.016$) and 3 weeks ($r = -0.60$, $p = 0.018$) post-infusion, but not at 10 weeks ($r = -0.26$, $p = 0.341$). Duration of exposure to low and high modeled effect-site propofol concentrations (1–2 $\mu\text{g/mL}$ or 2.5–4.5 $\mu\text{g/mL}$) did not correlate with spindle density changes ($p > 0.05$).

Conclusion: Serial infusions of propofol were associated with dose-dependent increases in spindle density and reductions in depressive symptoms. Spindle density may be an important marker or mediator of propofol antidepressant response. Future analyses incorporating N3 sleep and follow-up overnight recordings will determine the extent of spindle enhancement. A Phase II randomized controlled trial is now underway to examine the therapeutic potential of propofol-based sleep modulation in LL-TRD.

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0339

FEASIBILITY AND ACCEPTABILITY TESTING OF A DIGITAL WEBSITE PROTOTYPE TO PROMOTE BEDTIME ROUTINES IN SCHOOL-AGED CHILDREN

Alicia Chung¹, Tayla von Ash², Debbie Chung³, Azizi Seixas³, Girardin Jean-Louis³

¹NYU School of Medicine, ²Brown University School of Public Health, ³University of Miami

Introduction: More than one-third of children across the United States do not obtain enough sleep. Digital sleep interventions have been proven to effectively improve sleep duration in children, as well as health outcomes in the parent-child dyad. Preliminary implementation testing of a digital website prototype tool to promote parent-child engagement during bedtime routines was conducted among a sample of parents of children 6-10 years old to determine feasibility and acceptability of the tool, prior to pilot testing the intervention.

Methods: Three measures included in the validated Implementation Feasibility Questionnaire (Acceptability of Intervention Measure (AIM); Intervention Appropriateness Measure (IAM); and Feasibility of Intervention Measure (FIM) were administered to seven parents of school-aged children with mild sleep problems. Response items were on a 5-point Likert scale (1 = completely disagree; 5 = completely agree). Parents also completed an adapted version of Program Feedback Questionnaire to assess the following implementation science domains: usefulness, usability, acceptability, accessibility, usable/findable, feasibility, credibility, desirability and value, of the website prototype. Response options were reverse coded, with lower values indicating higher ratings (1 = strongly agree; 5 = strongly disagree). Mean scores were calculated for each implementation domain aforementioned.

Results: Mean scores for the Implementation Feasibility Questionnaire were reported as follows: AIM measure responses averaged 4.75; IAM measure responses averaged 4.78; and FIM measure responses averaged 4.67. Mean scores for the Program Feedback Questionnaire sub-domains were reported as follows: usefulness: 1.3; value: 1.0; acceptable: 1.0; usable/findable: 1.3; accessible: 2.1; feasible: 1.5; desirable: 1.4; credible: 1.4.

Conclusion: The website prototype was highly received, and implementation of the website intervention appears feasible and acceptable by parents of young children. Ongoing data collection will bolster sample size and continue to provide evidence towards intervention development.

Support (if any):

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0340

THE SLEEP-WAKE CLASSIFICATION PERFORMANCE OF PEDIATRIC-TRAINED MACHINE LEARNING ALGORITHMS FOR ACTIGRAPHY DATA

Pin-Wei Chen¹, Christopher Cielo¹, Olivia Walch², Peter Song², Cathy Goldstein², Jennette Moreno³, Erica C. Jansen², Jonathan Mitchell¹

¹Children's Hospital of Philadelphia, ²University of Michigan, ³Baylor College of Medicine

Introduction: Increasingly, actigraphy methods seek to leverage raw acceleration data and machine-learning scoring classification. However, much of the progress has been made in adults. We therefore trained machine-learning sleep-wake classifiers using pediatric data. We aimed to assess their sleep-wake scoring ability and benchmarked against an adult-trained classifier and algorithms in GGIR.

Methods: Sixty children (26 female, ages 5.3–17.7 years) completed in-lab overnight polysomnography at the Children's Hospital of Philadelphia and wore a GENEActiv device (3-axis accelerometer, 50 Hz) on their non-dominant wrist. The acceleration data were converted into 30-second epochs and aligned with physician-scored sleep-wake data from electroencephalography. Six machine-learning models were trained using leave-one-subject-out cross-validation. Epoch-by-epoch analyses generated performance metrics: sensitivity and specificity, with balanced accuracy (BA) used to rank. Discrepancy analyses compared the overall sleep duration estimated.

Results: Overall, 560.1 hours of data were collected; 74.4% of epochs were scored as sleep with an average sleep duration of 7.1 hours (SD = 1.9). Of the six pediatric-trained machine learning models, the top two were random forest (BA = 0.78; Sensitivity = 0.87; Specificity = 0.69) and neural network (BA = 0.77; Sensitivity = 0.83; Specificity = 0.73). These performance metrics exceeded that of an adult-trained neural net classifier applied to our data (BA = 0.71; Sensitivity = 0.93; Specificity = 0.49), but were comparable to the GGIR Cole-Kripke (GGIR-CK: BA = 0.79; Sensitivity = 0.75; Specificity = 0.85) and GGIR van Hees algorithms (GGIR-vH: BA = 0.78; Sensitivity = 0.84; Specificity = 0.73). Overall, sleep duration was underestimated by an average of 15 minutes using the random forest classifier and by an average of 37 minutes using the neural network classifier. For comparison, both GGIR-CK and GGIR-vH underestimated sleep duration by an average of 33 minutes.

Conclusion: We trained pediatric sleep-wake classifiers that had a strong ability to detect sleep and a moderate-to-strong ability to detect wake. Based on epoch-by-epoch and discrepancy analyses, the random forest classifier was the most optimal, outperforming GGIR-CK, GGIR-vH, and an adult-trained neural network classifier. With larger samples used for training and validation, we may reduce variability and further improve pediatric sleep-wake classification using actigraphy.

Support (if any):

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0341

A LARGE-SCALE EEG FOUNDATION MODEL ENABLES LABEL-EFFICIENT, MULTI-DEVICE SLEEP ANALYTICS

Jason Manley, Pierre Bartet, Franz Fürbass, Antoine Guillot, Alexander Chan
Beacon Biosignals, Inc.

Introduction: Contrastive self-supervised learning has advanced pretraining in computer vision and, more recently, EEG. However, most prior EEG work has focused on BCI or high-density recordings. Here, we develop a sleep-focused foundation model trained on a large heterogeneous corpus spanning PSG, 10-20 EEG and dry-electrode EEG (Waveband) recordings to improve label efficiency across diverse sleep analytics tasks.

Methods: We pretrained an ~5M-parameter encoder on >128,000 overnight sleep studies (PSG and dry-EEG) totalling ~1.8 million hours of EEG from 14 different datasets. A contrastive objective encouraged temporally and/or contextually similar windows to be closer in latent space than dissimilar ones. The pretrained model was fine-tuned on four downstream tasks: (1) sleep staging on PSG, (2) sleep staging on dry-EEG headband data, (3) EEG artifact detection on dry-EEG, and (4) arousal detection on PSG. For each task, we varied the number of fine-tuning recordings from 10 to the full labelled set. Performance was compared against a competitive fully-supervised baseline (RobustSleepNet or SimpleSleepNet) trained from scratch on the same number of recordings to quantify label-efficiency gains from pretraining.

Results: Across tasks, the pretrained model matched or approached state-of-the-art performance while requiring roughly 5–10× fewer labelled recordings. With only 10 fine-tuning recordings, it achieved Cohen's $\kappa = 0.716$ for PSG sleep staging, $\kappa = 0.730$ for dry-EEG sleep staging, $F1 = 0.968$ for artifact detection, and $F1 = 0.71$ for arousal detection. On the same amount of data, state-of-the-art baselines reached Cohen's $\kappa = 0.542$ for PSG sleep staging, $\kappa = 0.541$ for dry-EEG sleep staging, $F1 = 0.948$ for artifact detection, and $F1 = 0.65$ for arousal detection.

Conclusion: Contrastive self-supervised pretraining on a large, heterogeneous sleep EEG corpus yields substantial label efficiency and generalization across downstream tasks and devices, supporting foundation models as a practical and scalable approach for algorithm training on data-limited cohorts and tasks.

Support (if any):

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0342

A SPECTROGRAM-BASED 2D U-NET MODEL FOR AUTOMATED AROUSAL EVENT DETECTION

Ji Ho Choi¹, Tae Kyoung Ha², Ho Dong Lee², Young Jun Lee²

¹Soonchunhyang University College of Medicine, ²HoneyNaps USA

Introduction: Arousal events are transient interruptions of sleep caused by abrupt changes in neural and physiological activity, and accurate detection is essential for sleep staging and evaluating sleep-disordered breathing. However, manual scoring can be inconsistent due to subjective differences between scorers. To address this, we developed a spectrogram-based deep learning model that detects arousal events as a temporal segmentation task. This study presents the model's architecture, training strategy, and performance.

Methods: We developed an arousal detection model based on a two-dimensional U-Net architecture, using nine-channel spectrogram tensors of size (9, Frequency, Time) as input. Spectrograms were selected for their robustness to amplitude variability and their suitability for capturing the abrupt spectral changes characteristic of arousal events. The architecture comprises four key components: (1) Encoder-decoder, which reframes arousal detection as a segmentation task; (2) Bottleneck, which evaluates the relative importance of compressed feature channels; (3) Deep supervision, which stabilizes intermediate representations through auxiliary losses; and (4) Frequency convolution, which applies a final 1×1 convolution to infer the reliability of individual frequency components rather than using simple mean aggregation. The final Sigmoid layer outputs a 0–1 probability map indicating arousal likelihood. An optional freq = True mode aggregates the frequency axis using a learnable 1D Conv1d, but this

approach yielded negligible performance gains and was therefore omitted from the final model. Without frequency convolution, the model produces an output tensor of shape (1, Freq, Time), which is averaged along the frequency axis during inference to yield a final (1, 1, Time) arousal prediction sequence.

Results: We conducted a clinical trial with 99 participants. Golden reference data were generated using a two-thirds voting approach, and agreement analysis showed that arousal detection achieved a PPA of 82.2% and an NPA of 95%, outperforming typical human-scorers agreement.

Conclusion: The spectrogram-based U-Net effectively detects arousal events as a temporal segmentation task. It faithfully models the physiological definition of arousal, operates robustly, and is currently deployed in the SOMNUM.

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0343

A TRANSFORMER-BASED DEEP LEARNING MODEL FOR SLEEP/WAKE CLASSIFICATION IN ACTIGRAPHY

Sebastian Moguilner¹, Hui-Wen Yang², Shahab Haghayegh³, Frank Scheer⁴, Susan Redline⁵, Kun Hu⁶, Peng Li⁶

¹Harvard Medical School, ²Department of Biomedical Sciences and Engineering, Tzu Chi University, Hualien, Taiwan, ³Medical Biodynamics Center, Massachusetts General Hospital, Harvard Medical School, ⁴Division of Sleep and Circadian Disorders, Brigham and Women's Hospital, ⁵Brigham and Women's Hospital, ⁶Massachusetts General Hospital and Harvard Medical School

Introduction: Actigraphy enables cost-effective, long-term sleep monitoring; however, accurate sleep scoring based on activity counts remains challenging. Existing algorithms (e.g., the Cole-Kripke and Actiware) depend strongly on absolute activity-count levels without considering the temporal activity patterns during sleep-wake transition, making them sensitive to device-specific differences and limiting cross-device implementation.

Methods: We developed a novel deep learning algorithm with a Transformer-based architecture that leveraged self-attention mechanisms to capture complex sleep/wake transition patterns in activity counts and tested the performance for sleep/wake classification per 30-sec epoch. Positional embeddings preserve temporal order while self-attention captures local dependencies (30 minutes), such as sustained quiescence preceding sleep onset. Attended features are aggregated via global average pooling for binary classification. Training and internal validation were evaluated using the Multi-Ethnic Study of Atherosclerosis (MESA) datasets (n=1,404). Generalizability of the transformer-based model was assessed using external Out-of-Sample (OOS) datasets (n=25) collected in an in-laboratory study of daytime and nighttime workers, which involved sleep during nighttime and simulated daytime sleep schedules. For both training/validation and testing datasets, sleep/wake status was determined using polysomnography-based sleep scoring.

Results: In MESA, the model achieved an average accuracy of 0.79 +/- 0.01, an average AUC of 0.82 +/- 0.01, and an average F1 score of 0.82 +/- 0.01 across participants, effectively distinguishing between sleep and wakefulness. The model demonstrated a high stability on the external OOS datasets, achieving an average

accuracy of 0.95 +/- 0.01, AUC of 0.97 +/- 0.01, and F1 score of 0.84 +/- 0.02.

Conclusion: Our results demonstrate that a streamlined, attention-based Transformer model achieves robust sleep/wake classification using actigraphy. Future work will further evaluate its performance in larger, independent datasets and assess its capability in detecting sleep events outside the primary window (e.g., naps).

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0344

ACOUSTIC MEASUREMENTS MAY CONVENIENTLY MONITOR THE DEGREE OF LUNG INFLATION IN CPAP THERAPY

Junjie Liu¹, Mark Berardi²

¹Department of Neurology, University of Iowa, ²Dept. of Communication Sciences & Disorders, University of Iowa

Introduction: Continuous positive airway pressure (CPAP) is the predominant mode of therapy for obstructive sleep apnea (OSA). Recently, it became clear that excessively high pressure in CPAP overinflates the lung and may have harmful effects, but there is no bedside applicable method to monitor lung inflation and avoid excessively high CPAP. Here we describe a new method based on acoustic delay to monitor lung inflation.

Methods: A special sound wave was digitally designed such that its frequency smoothly fluctuated between 700 Hz and 900 Hz, and its amplitude fluctuated sinusoidally. This wave was played in loop by a small speaker into a small tube connected to the CPAP's main tubing near the face. Small button microphones were secured on the neck midline and on the lower chest wall and recorded breathing sounds that carried the specially designed sound wave. The time delay between the acoustic signals recorded from the neck and the chest wall was computed from the phase delay in cross-correlational analysis.

Results: We carried out preliminary measurements in normal human subjects. The acoustic time delay between the neck and the lower chest wall decreased by about 1.5 ms when CPAP increased from 4 to 15 centimeters of water.

Conclusion: Our preliminary results suggested that acoustic measurements can conveniently monitor the degree of lung inflation from CPAP in OSA treatment. Further measurements in sleeping OSA patients are under way.

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0345

CONTINUOUS SLEEP DEPTH AND FRAGMENTATION BIOMARKERS PREDICT APNEA AND AROUSAL BURDEN FROM PSG

Shaurya Bisht

Thomas Jefferson High School for Science and Technology

Introduction: The sleep process doesn't move in discrete boxes of thirty seconds, it slides continuously. We examine the question of whether a sleep-depth signal that continues through the sleep period, instead of discretized into stages, has the potential to provide sleep fragmentation indexes more informative than those based upon the latter.

Methods: The PhysioNet Haaglanden Medisch Centrum (HMC) sleep database consisted of 151 full-night polysomnograms, and a multitask neural network was applied to estimate a Sleep Depth Index (SDI) per epoch (0 = wake, 1 = deepest NREM), where a separate head handled REM sleep and a temporal smoothness term suppressed jitter. For each night, the SDI series yielded fragmentation indexes (mean SDI, time spent at low depths, total variation/volatility, and number of events where the index drops per hour). Physiologic validity was evaluated through correlations with delta power and density of spindles, while clinical validity was examined through associations with the apnea-hypnea index (AHI) and the arousal index (ArI), and through the ability to distinguish moderate to severe OSA (AHI ≥ 15) and severe OSA (AHI ≥ 30) through cross-validation across subjects.

Results: SDI tracked expected physiology, relating to delta band power (Spearman's $\rho = 0.71$) and spindle density ($\rho = 0.44$). SDI fragmentation biomarkers rose with severity and related to the AHI ($\rho = 0.47$) and ArI ($\rho = 0.53$). The biomarker model for the prediction of an AHI of ≥ 15 events/h had an AUC of 0.78 and for the prediction of an AHI of ≥ 30 events/h the model's AUC was 0.80, an improvement upon the model based upon sleep stage (delta AUC = 0.04) for the prediction of an AHI of ≥ 15 events/h and 0.05 for the prediction of an AHI of ≥ 30 events/h.

Conclusion: The sleep fragmentation signatures derived in this manner are interpretable and correlate with the sleep apnea and arousal events recorded in PSG sleep studies. "SDI-type" metrics might be combined with traditional sleep staging to assess the value of instability in a way that has scaling potential in terms of relating PSG physiologic measures to meaningful risk.

Support (if any):

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0346

RETRIEVAL AUGMENTED GENERATION IMPROVES LARGE LANGUAGE MODEL PERFORMANCE IN SLEEP MEDICINE

Joseph Cheung, Pengze Li, Anshum Patel, SaiKrishna Vallamchetla, Het Contractor, Hayden Heninger, Cui Tao
Mayo Clinic Jacksonville

Introduction: While Large Language Models (LLMs) offer generative capabilities, generic models often lack domain-specific grounding, leading to hallucinations in high-stakes contexts. However, LLMs can serve as clinical decision support tools if augmented with specific domain data. This study evaluates the utility of Retrieval-Augmented Generation (RAG) applied to open-source LLMs, utilizing a curated knowledge base of authoritative sleep medicine textbooks, to quantify improvement in performance.

Methods: We evaluated four open-source models—Llama-70B, Llama-8B, Qwen-14B, and Qwen-235B, linked to a RAG system indexing five standard textbooks, including ICSD-3 TR. Models were tested on sleep board-style MCQs and clinical vignettes diagnostic accuracy. Performance was assessed across nine configurations derived from three factors: RAG pipeline complexity (Plain vs. Complicated), textbook preprocessing (Uncleaned vs. Cleaned/TOC-aligned), and retriever type (Dense-only vs. Hybrid). Metrics included MCQ Accuracy and the rates at which the correct diagnosis appeared as the top result or within the top 5 differential diagnosis lists for vignettes.

Results: RAG consistently outperformed the no-RAG baseline, yielding absolute performance gains of 5.6%–10.7% for MCQs and

8.1%–10.2% for the top diagnosis in cases across all models. For MCQs, Qwen-235B achieved the highest accuracy of 87.3% (vs. 81.7% baseline) using the Plain RAG configuration with Cleaned (TOC-aligned) Hybrid retrieval. Llama-70B followed with 83.6% in the same configuration. For case vignettes, Qwen-235B achieved a correct top diagnosis rate of 66.3% and a correct diagnosis rate within the top 5 differential diagnosis lists of 90.8% using Cleaned Hybrid retrieval configurations. Hybrid retrieval (Dense + Sparse) consistently surpassed Dense-only methods. Notably, while larger models benefited from Cleaned text, smaller models (e.g., Qwen-14B) achieved higher top diagnosis rates with Uncleaned text (57.1% vs. 51.0%), suggesting a dependency on redundant context in lower-parameter settings.

Conclusion: RAG significantly enhances knowledge performance of open-source LLMs in sleep medicine. Hybrid retrieval and curated, TOC-aligned knowledge bases yield optimal results for large models, whereas smaller models benefit from the redundancy of uncleaned text. These findings suggest that RAG systems can augment LLMs in domain specific knowledge for clinical decision support.

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0347

SCREENING INTERVENTIONS IN PERI-SLEEP THERMODYNREGULATION: A SCOPING REVIEW

Spencer MacLellan, Kearney Smith, Jessica Dietch
Oregon State University

Introduction: Thermal dysregulation before and during sleep contributes to difficulty initiating sleep, reduced comfort, and impaired sleep quality. Recent work in peri-sleep thermoregulation includes developments in both screening tools and intervention approaches, including clinical assessments and consumer-oriented devices. Developments in thermoregulatory have been developed as both interventions and screening tools. However, screening methods and early-stage interventions used to identify or address peri-sleep thermoregulation challenges have not been clearly mapped. The goal of this study is to review human studies evaluating peri-sleep thermoregulatory interventions and to summarize the approaches, outcomes, and existing gaps via scoping review.

Methods: Following JBI and PRISMA-ScR guidance, we searched PubMed, PsycINFO, and Web of Science from inception to October 2025, supplemented by grey literature. After removal of 1,786 duplicates, 1,803 records underwent title and abstract screening, and 199 full texts were assessed. Studies were included if they involved adults (≥ 18 years), evaluated a peri-sleep thermoregulatory screening or intervention strategy, and reported at least one sleep and one thermoregulatory variable. Exclusion reasons included absence of temperature data, pharmacological-only interventions, manikin-only testing, non-peri-sleep contexts, and lack of sleep outcomes. Ninety-one studies were included for extraction.

Results: Interventions fell into the following categories: passive heating (e.g., warm baths, footbaths), passive cooling (e.g., cooling bedding), environmental modifications (e.g., ventilation, bedding changes), wearable sensors or smart textiles, and behavioral strategies designed to influence distal-proximal temperature gradients. Most studies used small samples of healthy adults in controlled laboratory or sleep-center environments. Improvements

were most commonly reported for sleep onset latency, subjective sleep quality, and thermal comfort. Thermoregulatory outcomes and measurement methods varied widely across studies, often limiting comparability. Very few studies evaluated structured screening tools, or feasibility/acceptability of thermoregulatory interventions.

Conclusion: Peri-sleep thermoregulation research spans diverse strategies but lacks standardized screening methods, consistent outcome measurement, and evidence in real-world, climate-relevant contexts. Findings highlight a need for validated screening tools, increased applicability to individual living contexts, community-engaged methods and broader inclusion of vulnerable populations.

Support (if any):

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0348

UTILITY OF LARGE LANGUAGE MODELS FOR EXTRACTING SLEEP APNEA SPECIFIC SYMPTOMS AND MAJOR ADVERSE CARDIOVASCULAR EVENTS FROM ELECTRONIC HEALTH RECORDS

Nagharjun Mathi Mariappan¹, Sajila Wickramaratne¹, Zachary Roberts¹, Li Zhou¹, Yutong Dong¹, Korey Kam¹, Thomas Tolbert², Andrew Varga¹, Indu Ayappa², David Rapoport², Ankit Parekh¹

¹Icahn School of Medicine at Mount Sinai, ²David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Electronic Health Record (EHR) clinical notes contain important symptom and event information that is often missing from structured fields. Automated extraction using large language models (LLMs) and supervised natural language processing (NLP) methods may support scalable clinical research. This study evaluates the utility of multiple methodological approaches, including prompt-based LLM extraction to supervised Bidirectional Encoder Representations from Transformers (BERT)-based classification and Named Entity Recognition (NER), for extraction of symptom and event information

Methods: Data from 215 suspected sleep apnea patients were assessed of whom 50 had documented sleep apnea symptoms, 145 had documented cardiovascular disease events and/or OSA diagnosis, and 20 had documented symptoms of cognitive impairment. All clinical notes were preprocessed using standard NLP pipelines. For sleep symptom and CVD event extraction, a hyperparameter-tuned BERT model was applied for both classification and NER tasks. For cognitive impairment symptom extraction, zero-shot prompting with Llama 3.1 405B generated structured outputs indicating symptom presence or absence. Model performance was evaluated using precision, recall, and F1 score, with F1>80% considered reliable.

Results: In the sleep symptom cohort, the BERT model achieved an average F1 score=0.86. In the CVD cohort, CAD was identified in 34 patients and OSA in 103 patients. The BERT model reliably classified CAD versus non-CAD (F1>0.80). False negatives were primarily due to missing documentation from external healthcare systems. Integration of ICD codes post hoc improved model specificity. LLM-based extraction successfully identified core cognitive impairment-related symptoms, with performance improving through targeted prompt engineering; however, hallucinations were observed with incomplete clinical documentation.

Conclusion: BERT models demonstrated reliable performance for extraction of OSA symptoms and CAD classification from unstructured EHR notes ($F1 > 0.80$). LLM-based extraction of cognitive impairment-related symptoms showed moderate performance ($F1 = 0.76$) and was highly sensitive to prompt design and documentation quality. Overall, supervised NLP currently provides the most reliable approach for clinical event extraction from EHR notes, while LLMs show promise for more flexible symptom retrieval.

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0349

VALIDATION OF A NOVEL ALGORITHM FOR AASM SLEEP STAGE CLASSIFICATION WITH A PAT-BASED HOME SLEEP TEST COMPARED TO SIMULTANEOUS POLYSOMNOGRAPHY

Luu Pham¹, Jonathan Jun², Riva Tauman³, Alan Schwartz⁴

¹Johns Hopkins University, ²Johns Hopkins University School of Medicine, ³Sieratzki Sagol Institute for Sleep Medicine, Tel Aviv Souraski Medical Center, Gray faculty of Medical and Health Sciences, Tel Aviv University, ⁴University of Pennsylvania, Perelman School of Medicine

Introduction: Accurate sleep staging in the ambulatory setting with EEG is challenging and increases patient burden. The WatchPAT (WP, ZOLL Itamar), is a widely used PAT-based home sleep apnea test. The company recently applied modern supervised machine learning techniques to develop a new algorithm for comprehensive sleep staging based on clinical features and accumulated knowledge gleaned over 20 years of field experience. Over 900 simultaneous nocturnal WP and polysomnography (PSG) recordings were used in algorithm development to generate all stages (N1, N2, N3, REM and wakefulness). A Long Short-Term Memory (LSTM) network and a Hidden Markov Model based decoder were trained on a wide range of clinically significant features (hemodynamic, HRV, respiratory, oximetry, atonia, etc.), derived from WP channels. This study aimed to evaluate the performance of the new algorithm compared to gold standard PSG for sleep stage classification.

Methods: Prospective multi-center study with simultaneous WP and PSG recordings were conducted to validate the algorithm. PSG recordings were staged according to AASM guidelines by two independent scorers. We examined the agreement between WP to the consensus of PSG scorers (approximately 80% of all epochs) and to each scorer, individually, with Cohen's kappa (κ).

Results: The validation set of 231 subjects (141 Males, Age 52.4 ± 17.8 years, BMI 32.0 ± 8.6) was included in the final analysis. The average percentage of each sleep stage was similar between WP and consensus. Percentages [SD] for WP and PSG respectively were: Wake: 26.57% [16.63], 26.38% [16.96]; N1: 2.5% [1.79], 3.72% [3.81]; N2: 47.53% [13.34], 48.83% [15.76]; N3: 8.69% [8.42], 9.38% [8.65] and REM: 14.72% [8.76], 11.69% [8.36]. Epochs with consensus between scorers had substantial agreement with the algorithm for AASM stages ($\kappa=0.65$), wake/sleep separation ($\kappa=0.77$), and REM/NREM ($\kappa=0.73$). When including epochs without scorer consensus, κ between the WP and individual scorers for AASM stages were 0.51 and 0.59 (moderate agreement), suggesting that mixed or ambiguous features in some epochs accounted for reductions in agreement between scorers and the algorithm.

Conclusion: The new WP staging algorithm demonstrated substantial agreement with PSG for sleep stage classification. WP holds promise for detailed sleep characterization in the ambulatory setting, without EEG.

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0350

LEVERAGING SLEEP-RELATED COGNITIVE SUSCEPTIBILITY AND POLYSOMNOGRAPHY-BASED SLEEP FEATURES TO DETECT DEPRESSION IN ADOLESCENTS USING MACHINE LEARNING

Hao Fong Sit¹, Yee Lok Wong¹, Zihan Chen¹, Tim Man Ho Li², Qianqian Ju³, Ran Wang¹, Xiao Li¹, Rachel Ngan Yin Chan⁴, Joey Wing Yan Chan⁴, Yun Kwok Wing⁴, Shirley Xin Li⁵

¹University of Hong Kong, ²Chinese University of Hong Kong, ³Shanghai University of Sport, ⁴Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong, ⁵Department of Psychology, The University of Hong Kong, Hong Kong Special Administrative Region, Hong Kong

Introduction: Depression is common and often associated with adverse psychosocial outcomes among adolescents. Early and accurate identification of depression is therefore crucial for this vulnerable population. However, current screening and diagnostic methods for depression often rely only on subjective assessments and clinical interviews. This study aimed to determine whether sleep-related cognitive susceptibility and polysomnography-based sleep features could detect depression among adolescents using machine learning (ML).

Methods: A total of 100 adolescents (Mean age = 17.4 ± 2.0 ; range 12-20 years; 54% female), including 50 diagnosed with DSM-5 depressive disorders [SL1.1] and 50 controls, were recruited. Participants completed a diagnostic interview and self-report questionnaires assessing insomnia severity, eveningness, and sleep-focused rumination. Participants completed a two-night laboratory-based PSG, with the first night serving as the adaptation night. Sleep data on the second night were extracted to assess sleep architecture and spectral power. Depression diagnosis served as the model output (e.g., Yes/No). The dataset was split into two, with 80% of the data randomly allocated to the training set and 20% to the validation set. A 10-fold cross-validation was used to evaluate five algorithms, namely linear discriminant analysis (LDA), classification and regression trees (CART), k-Nearest Neighbors (kNN), Random Forest (RF), and Logistic Regression (LR), which were specified to predict depression.

Results: The best-performing algorithm is RF, followed by CART, kNN, LDA, and LR. RF achieved an accuracy of 80.0%, sensitivity of 90%, specificity of 70%, and an AUC of 0.83 in the validation subsample.

Conclusion: This study demonstrates that leveraging sleep-related cognitive susceptibility, objective sleep parameters, and sleep EEG spectral power in trained ML models can effectively identify depression among adolescents. The findings support the feasibility of developing comprehensive, sleep-focused, data-driven screening methods to facilitate early detection and intervention in adolescent depression. Future research could validate these findings with existing depression screening tools and in larger, more diverse populations.

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0351

USABILITY TESTING OF A DIGITAL BEHAVIORAL SLEEP TOOL FOR CAREGIVERS OF SCHOOL-AGED CHILDREN: ALPHA AND BETA TESTING OF A BEDTIME ROUTINE TOOL

Alicia Chung¹, Kayla DesPortes², Tayla von Ash³, Debbie Chung⁴, Azizi Seixas⁴, Girardin Jean-Louis⁴

¹NYU School of Medicine, ²New York University, ³Brown University School of Public Health, ⁴University of Miami

Introduction: More than one-third of children across America do not get enough sleep. Bedtime routines are a gold standard to address sleep duration in children. We aim to conduct usability testing to evaluate how caregivers interact with a) a lo-fi prototype decision-aide tool as part of the bedtime routine; and b) a hi-fi digital prototype version of the decision-aide tool to support bedtime routine, to refine effectiveness based on user feedback.

Methods: Qualitative methods were applied during in-person interviews of ten parents of children 5-10 years old for usability testing of a behavioral sleep tool (5 for lo-fi prototype alpha version; 5 for hi-fi prototype beta version). Observations of participants completing eight discrete tasks of the beta version of the website were conducted, along with a short survey on the usefulness, user-friendliness, and attractiveness, on a 5-point scale, with 5 being the highest rating.

Results: Five parents (all female) tested the lo-fi prototype at home with their children for five nights. Participants reported the lo-fi prototype was easy to understand, effective, and served as a visual reference to center themselves and stay on track during bedtime. Participants recommended including pre-bedtime soothing activities and to orient themselves with the poster before using it with their child. All parents reported they would use it again. Another five caregivers (1 male; 4 female) tested the hi-fi digital prototype. Participants reported the following ratings of the hi-fi prototype: usefulness: 5; user-friendliness: 4; attractiveness: 5. Parents recommended increasing the font size, access on other digital devices (e.g. phone/iPad), the ability to purchase the books listed, and a demonstration video for the belly-breathing exercise mentioned. Parents found the digital prototype informative, straight-forward, aesthetically pleasing, and reported that it included tools that they would use with their children during bedtime.

Conclusion: Overall, parents provided positive feedback on the bedtime routine decision-aide prototypes. Bedtime strategies resonated with parents, and they expressed interest in wanting to try the bedtime strategies described in the tool. A bedtime routine decision-aide tool that supports parent-child bonding, emotions and child independence may be an engaging way to promote bedtime routines in young children.

Support (if any):

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0352

A NOVEL OPEN-SOURCE GUI APPLICATION FOR EFFICIENT ACTIGRAPHY SLEEP AND NAP SCORING

Uzair Alam¹, Rohitaa Ravikumar¹, Sai Vemu², Salma Musaad¹, Maurice Puyau¹, Akane Sano³, Teresia O'Connor¹, Jennette Moreno¹

¹Baylor College of Medicine, ²Rice University, ³Department of Electrical and Computer Engineering, Rice University

Introduction: Manual actigraphy sleep scoring is time-intensive and requires managing multiple data sources simultaneously. Automated approaches are quicker but often lack validated, accurate nap detection and interpretability. Graphical user interface (GUI) applications such as ActiSleep Tracker and ActiLife address some issues but have performance and customizability limitations. We developed a novel open-source GUI application to streamline sleep scoring, implementing a user-friendly interface for a previously established manual scoring method. We preliminarily validated the application to establish sleep/wake metric and inter-rater reliability equivalence with the original method.

Methods: The application was developed to integrate data from wrist-worn Ametris wGT3X-BT devices, ActiLife epoch and non-wear sensor exports, the Sadeh sleep-wake algorithm, Choi non-wear algorithm, onset/offset scoring rules, and sleep diaries, all originally used for the manual method. Ten-day actigraphy data from thirty 3-5-year-old children in free-living conditions with minimal non-wear time were scored by three raters using both the manual (M) method and application (App). Scoring time was recorded using a separate application, and IDs were randomized. Inter-rater reliability for scorers' onset/offset ranges and inter-method agreement for sleep-wake metric/algorithm implementations were evaluated with intraclass correlations assuming representative random sampling for raters and data (ICC(2,1)).

Results: The application improved scoring speed by 3.3×, reducing mean scoring time by 14.9 minutes/participant (n=88; M: 21.5±8.9 min; App: 6.6±1.8 min, p< 0.001, d=1.72). For matched sleep periods including naps (n=391), both methods showed excellent interrater reliability ICCs (App_onset=0.99, App_offset=0.99; M_onset=0.99, M_offset=0.98). Excluding naps (n=295), manual was significantly less reliable for offset (App_onset=0.95, App_offset= 0.99; M_onset=0.96, M_offset=0.82). Inter-method agreement for sleep metrics from pooled, matched sleep periods from all raters (n=1240) yielded ICCs of 0.99 (Total Sleep Time), 0.90 (Wake After Sleep Onset), 0.89 (Sleep Efficiency), 0.98 (Time in Bed). However, all variance was explained by scorers' different onset/offsets between methods (Lin's CCC=1.00), confirming algorithmic and metric equivalence.

Conclusion: The application demonstrates significantly faster scoring speed, maintains inter-rater reliability for naps and improves/maintains it for main sleep periods, while preserving algorithmic and metric equivalence. Its open-source nature and modular architecture support integration of numerous features. Future work will compare against consensus validation and incorporate additional algorithms.

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0353

AUTOMATED SYNCHRONIZATION OF WRIST-WORN SLEEP DATA WITH POLYSOMNOGRAPHY USING HEART RATE NORMALIZED CROSS-CORRELATION

Matthew Patterson, Sylvain Zorman, Andy Liu, Rakesh Pilkar, Dawid Gerstel, Michael Philcock, Christine Guo
Ametris

Introduction: Accurate validation of sleep staging algorithms from wrist-worn wearable sensors against polysomnography (PSG) requires precise temporal alignment between the two datasets. Traditional manual synchronization methods, such as event marker presses or device taps, are prone to errors, burdensome for participants and study sites, and labor-intensive for post-processing. The advent of photoplethysmography (PPG) sensors in modern wrist-worn devices enables reliable heart rate estimation, providing a robust physiological signal for automated alignment. Herein, we propose a method to synchronize wrist-worn wearable data with PSG using heart rate signals from both systems.

Methods: We developed an automated synchronization approach leveraging heart rate (HR) signals from a wrist-worn wearable and a 4-lead electrocardiogram (ECG) during PSG. HR data from both sources were aggregated into 1-second medians. Normalized cross-correlation analysis was performed by shifting the wearable HR signal relative to the ECG signal in 1-second increments over an adjustable ± 60 -second window, yielding 121 normalized correlation coefficients. The lag maximizing the normalized cross-correlation served as the synchronization offset. To mitigate artifacts from device processing errors or R-peak detection inaccuracies, only physiologically plausible HR values (30–200 bpm) were included in the correlation computation.

Results: In simulated datasets with induced artificial lags ranging from -30 to +30 seconds, the method recovered offsets with near-perfect accuracy. Visualizations of pre- and post-synchronization HR traces demonstrated tight alignment, with normalized cross-correlation plots exhibiting sharp peaks at the true offset, confirming robust detection even amid noise. Application to real validation datasets ($n=30$ nights) achieved clear peaks in the normalized cross-correlation output and reduced manual synchronization time by over 80%.

Conclusion: Normalized cross-correlation of HR signals provides a reliable, automated method for synchronizing wrist-worn wearable data with PSG, enhancing the efficiency and accuracy of sleep staging validation studies. This approach minimizes human error and scales well for large cohorts, paving the way for broader adoption of wearables in clinical sleep research.

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0354

EFFECTS OF IN-BED TEMPERATURE PROGRAMS ON SLEEP DURATION: LARGE-SCALE DATA FROM A SMART BED PLATFORM

Gary Garcia Molina¹, Megha Rao¹, Vidhya Chellamuthu¹, Leah McGhee¹, Trevor Winger¹, Nikhil Makaram¹, Pavlo Chernega², Yehor Shcherbakov², Erwin Veneros³, Raj Mills¹

¹Sleep Number, ²GlobalLogic, ³Nanami

Introduction: The ability of a smart bed platform to control the in-bed temperature was leveraged to identify changes in temperature across the night that might enhance sleep quality. A whole-night temperature program consists of four sequential 2-hour segments, each with a specific temperature setting (heating or cooling) at three possible intensity levels (low, medium, high), starting about 30 minutes before sleep onset. Heating and cooling are accomplished by respectively pushing warm air into the bed microclimate or pulling air from it. The smart bed includes validated ballistocardiography-based algorithms to quantify movement and cardiorespiratory metrics during sleep. From these, sleep and restful sleep durations were estimated. Restful sleep corresponds to sleep with sub-threshold movement level.

Methods: Thirty-one participants (12F/19M, mean age 48.6 (SD: 11.2) years-old), recruited among smart bed owners, enrolled in a controlled study within their homes. Each participant experienced 4 OFF only sessions and 10 sessions with temperature programs including balanced heating/cooling conditions. Additionally, the data from 2.2 million sleep sessions from 33'814 Sleep Number customers (17482 F/16332 M; mean age 48.8 (SD: 7.0) years-old) that experienced self-applied temperature settings were used to refine the temperature program recommendations. Linear mixed models were used to determine the optimal temperature program (i.e. temperature setting for each segment) to increase restful sleep.

Results: CONTROLLED STUDY For women and men, heating in the first segment followed by cooling in the second segment significantly increased restful sleep duration by 14.9 and 19.4 minutes respectively. FIELD DATA These data allowed us to identify the temperature setting for each sequential segment to maximize restful sleep relative to Off. Restful sleep (women) $\sim 478.8 + 7.14 \times \text{Low Heating} + 0.65 \times \text{Medium Cooling} + 1.80 \times \text{Low Cooling} + 3.49 \times \text{Low Cooling}$ [minutes] Restful sleep (men) $\sim 448.2 + 6.84 \times \text{Low Heating} + 0.67 \times \text{Low Cooling} + 2.80 \times \text{Medium Cooling} + 2.59 \times \text{Low Cooling}$ [minutes] The optimal temperature program may increase restful sleep duration by 13.1- and 12.9-minutes relative to Off, in women and men respectively.

Conclusion: The results using the controlled study and field data are consistent and suggest that starting with low heating and following with cooling settings may increase restful sleep duration.

Support (if any):

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0355

EFFECTS OF A BEDSIDE AIR PURIFIER WITH SUNRISE ALARM ON OBJECTIVE SLEEP AND SELF-REPORTED OUTCOMES

Sharon Danoff-Burg¹, Holly Rus², Aislinn Beam², Henry Lopez², Devanshi Upadhyaya², Morgan Weaver², Kiara Carmon², Duvia Lara Ledesma²

¹Sleep.ai, ²SleepScore Labs, powered by Sleep.ai

Introduction: Airborne pollutants and allergens can disturb breathing and sleep. The current study examined the effects of a bedside air purifier with sunrise alarm on objective sleep and self-reported outcomes.

Methods: Healthy adults ($N=27$; 74% female; M age=40) who reported difficulty falling or staying asleep participated in a 6-week in-home pre-post study. During baseline, participants slept without the device; during the intervention, they slept using the

Blueair MiniRestful Air Purifier + Sunrise Alarm Clock. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period questionnaires assessed perceived sleep quality, relaxation before bed, restfulness upon waking, and perceived air quality. Analyses included multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across 1,100 nights, no significant differences were observed in objective sleep metrics. However, participants reported statistically significant improvements in multiple self-reported domains. Compared to baseline, they felt more relaxed before bed (+35%), found it easier to fall asleep (+30%), and reported higher perceived sleep quality (+47%; all $ps < .001$). Participants also experienced greater satisfaction with sleep (+29%), fewer nights of tossing and turning (-41%), and better perceived bedroom air quality (+64%; all $ps < .001$).

Conclusion: Although objective sleep remained stable, using a bedside air purifier with sunrise alarm was associated with meaningful improvements in perceived sleep quality, relaxation, and air freshness, suggesting potential value for enhancing the bedroom sleep environment.

Support (if any): Blueair

Abstract citation ID: zsa091.0356

0356

MACHINE LEARNING DETECTION OF AROUSALS FROM AT-HOME SLEEP EEG DEVICE DEMONSTRATES SUPERIOR RELIABILITY COMPARED TO EXPERTS

Franz Furbass, Jack Sampiere, Jay Pathmanathan, Antoine Guillot, Alexander Chan
Beacon Biosignals, Inc.

Introduction: Cortical arousals provide insights into sleep pathologies and sleep quality through relationships to daytime impairment, respiratory event related arousals (RERAs), and hyperarousal patterns in patients with various sleep and psychiatric conditions. Scoring arousals from in-lab polysomnography (PSG) by expert readers is the gold standard, but is burdensome, labor-intensive, and subject to significant inter/intra-rater variability. Here, we compare the detection of arousals from PSG to Waveband [1], an FDA-cleared, at-home, dry-electrode EEG device that captures cortical arousals and other sleep metrics.

Methods: Waveband and PSG were simultaneously recorded from 36 individuals (ages 25-65, 69% female) overnight. Arousals were scored by 5 Registered PSG Technologists (RPSGT) following AASM guidelines using PSG signals, only to serve as ground-truth for algorithm evaluation. Arousals on Waveband were detected by a machine-learning algorithm trained on over 15k nights. Performance was evaluated by computing the Intraclass correlation coefficient (ICC) of the model's Arousal index (ArI, arousals per hour sleep) to the scorers' ArI, as well as by comparing 30-second epochs with or without arousals to the scorers' majority vote to compute Cohen's Kappa.

Results: The mean ArI ICC between pairs of human scorers was 0.74 (SD=0.107, range: 0.58-0.88). The mean ICC between Waveband's ArI and individual scorers was 0.89 (SD=0.039, range: 0.74-0.85). Comparing the Waveband ArI to the average ArI of all scorers resulted in an ICC of 0.89 (95% CI: 0.84-0.94). The 95% bootstrapped confidence interval of the difference of the average Waveband to the average scorer ArI ICC resulted in a lower bound of 0.006, demonstrating superiority of Waveband to score ArI over

the average expert. Waveband's epoch-level kappa of 0.59 (95% CI: 0.55-0.62) exceeded most experts' agreement (0.44 to 0.61, based on other raters' majority vote).

Conclusion: An at-home sleep EEG device with an associated machine learning algorithm is able to detect arousals with a high epoch-level agreement and provides an estimate of arousal index with superior reliability than the human experts in our study. These findings demonstrate the potential for scalable, objective quantification of sleep fragmentation in real-world settings, possibly enabling more efficient evaluation of therapies and future diagnostic applications. [1] <https://beacon.bio/products-services>

Support (if any):

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0357

MACHINE LEARNING MEETS MEDICINE: ASSESSMENT OF LARGE LEARNING MODULES ANSWERS TO PATIENT SLEEP-RELATED QUESTIONS

Fauzieh Dabaja, Mehwish Sajid, Xinhang Tu, Punithavathy Vijayakumar
University of Michigan

Introduction: Large learning modules (LLM) are now available for use by the general population, and patients now approach these modules to answer medical questions, despite or in lieu of visiting a physician. These modules provide accessible, easy to understand, and rapid results. The accuracy of these modules varies, and their accuracy and clinical alignment remain uncertain. This study aimed to evaluate and compare three different LLM answers about sleep medical problems.

Methods: A prompt was generated to request a set of most common sleep medicine asked questions by ChatGPT users. Questions then entered into three Large Learning Modules: ChatGPT 5.1, Gemini 3 and Perplexity. Answers were reviewed independently by five board certified sleep medicine physicians for accuracy and clinical appropriateness based on a 5-point scale, reviewers were blinded for the names of the LLM used. Friedman's test was used to compare rating across three platforms treating each answer as a repeated measure.

Results: Across the 10 standardized sleep-related questions, the average accuracy scores for the three large language models (ChatGPT, Gemini, and Perplexity) were 80%, 80%, and 87%, respectively. Clinical appropriateness scores averaged 85% for ChatGPT, 79% for Gemini, and 88% for Perplexity. A Friedman test comparing accuracy ratings across models demonstrated no statistically significant difference ($\chi^2 = 5.20$, $p = 0.0743$). In contrast, the Friedman test for clinical appropriateness revealed a statistically significant difference among the three platforms ($\chi^2 = 6.87$, $p = 0.0323$), indicating meaningful variation in the clinical suitability of responses.

Conclusion: Clinicians should be aware that patients frequently use learning modules to help answer clinical concerns. Although they may help enhance patient engagement they may be laced with subtle inaccuracies, over generalized recommendations, and false reassurance. Clinical encounters may involve clarifying misconceptions and helping guide patients to more individualized and evidence-based care. LLM can vary in their clinical appropriateness and as more models are being trained to use more accurate medical resources this will improve its output.

Support (if any):

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0358

SEASONAL RHYTHMS IN WEARABLE-DERIVED SLEEP ACROSS U.S. LATITUDESKatherine Ross, Karina Pereira-Lima, Kerby Shedden, Srijan Sen
University of Michigan

Introduction: Humans exhibit circadian rhythms in sleep, but it is unclear whether they also display annual cyclical patterns. In other species, circannual rhythms often vary with latitude, with greater amplitude and predictable shifts in peak timing at higher latitudes. Demonstrating similar latitudinal clines in human sleep would provide evidence consistent with a circannual component to annual sleep variation. This study tests whether daily total sleep time (TST) and sleep midpoint exhibit annual rhythmicity and whether the amplitude and timing of these rhythms vary across geographic location.

Methods: This study uses yearlong wearable sleep data from the 2018–2022 cohorts of the Intern Health Study (IHS), a longitudinal study of first-year medical residents. Annual seasonality in daily sleep was tested using cosinor models. Latitude effects were evaluated in mixed-effects models that allowed the amplitude and phase of these rhythms to vary by location. Amplitude and peak timing were derived from model coefficients for interpretation.

Results: Both TST and sleep midpoint showed evidence of annual rhythmicity. Average TST did not differ significantly by latitude; however, peak TST was slightly greater and occurred earlier at higher latitudes. In contrast, neither sleep midpoint amplitude nor phase varied significantly across latitudes.

Conclusion: Annual rhythms in both TST and sleep midpoint, along with modest latitudinal differences in TST amplitude and peak timing, support the presence of latitudinal clines in annual sleep patterns, consistent with a circannual component for duration but not timing. Future research could explore whether these annual patterns reflect endogenous circannual processes, environmental influences, or their interaction by incorporating objective light exposure and physiological circadian markers to more directly assess mechanisms underlying annual sleep variation.

Support (if any):

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0359

SLEEP-JEPA: JOINT EMBEDDING REPRESENTATIONS OF SLEEP STUDY DATA ACCURATELY ESTIMATE SLEEP FEATURES AND LONG-TERM HEALTH OUTCOMESBenjamin Fox¹, Sajila Wickramaratne¹, Mayte Suarez-Farinas¹, Neomi Shah², Girish Nadkarni¹, Ankit Parekh¹¹Icahn School of Medicine at Mount Sinai, ²Division of Pulmonary, Critical Care and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Sleep disorders and deprivation disrupt daily life and are linked to 7 of the 15 leading causes of death in the United States. Early detection, clinical management, and lifestyle changes are key for reducing risk. Sleep studies vast stream of sensor data along with cohort datasets' long-term health outcome labels could be linked with advanced machine learning

methods. Specifically, the transformer model, combined with self-supervised training techniques are well-suited to learn multi-channel signal representations and estimate risk for various outcomes including CV disease, stroke, and myocardial infarction.

Methods: We utilized the Human Sleep Project (n=24,986), Mt. Sinai Polysomnography (n=8,547), MrOS (n=3,925), SHHS (n=8,444), Wisconsin Sleep Cohort (n=2,544), APPLS (n=1089), Mignot Nature Communications (n=1355), and MESA (n=2,055) sleep datasets to train a foundational transformer using a joint embedding predictive architecture (JEPA). The model learned representations of full-night (6-12 hour) sleep studies across seven channels: a single EEG (C4-M1 or C3-M2), left EOG, chin EMG, lead II ECG, SpO2, and abdomen and thoracic respiratory rates. Following self-supervised training, these representations were input into a non-linear probing classification model with a discrete hazard loss function to predict sleep stages, objective daytime sleepiness based on MSLT, incident hypertension, stroke, myocardial infarction, and CV mortality using the SHHS and MrOS datasets.

Results: Sleep-JEPA's frozen representations estimated an average area under the receiver operating characteristics curve of 0.96 across 5-stage sleep (average precision [AP] of 0.79), 0.72 on objective daytime sleepiness (MSLT < 8 min, AP of 0.35, ~2.5x prevalence), 0.77 for CV mortality at 15 years (Concordance index [C-index]: 0.78), 0.74 for stroke at 15 years (C-index: 0.70), 0.83 for myocardial infarction at 15 years (C-index: 0.80), and 0.82 for incident hypertension at 10 years (C-index: 0.70) indicating good discriminative performance.

Conclusion: A foundational transformer trained via the JEPA procedure can learn relevant representations of full-night, multichannel PSG data and these representations can estimate sleep features and long-term health outcomes. Future work will include additional outcomes including OSA, diabetes, and cognitive decline, baseline comparisons, and explore explainable attributions.

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0360

SOFT WIRELESS WEARABLE BIOELECTRONICS FOR CONTINUOUS MONITORING OF BRAIN WATER DYNAMICS ACROSS SLEEP STAGESSeunghyeon Ban¹, Chang-Ho Yun², Woon-Hong Yeo¹¹Georgia Institute of Technology, ²Department of Neurology, Seoul National University Bundang Hospital, Seoul National University College of Medicine

Introduction: The glymphatic system regulates cerebrospinal fluid (CSF) flow to clear metabolic waste. But continuous monitoring of CSF dynamics during natural sleep remains challenging. We developed a wireless, flexible brain-water near-infrared spectroscopy (BW-NIRS) device for long-term, noninvasive measurement of CSF-linked brain water dynamics and associated physiological rhythms during sleep.

Methods: The BW-NIRS device integrates multi-wavelength LEDs (640, 680 and 950 nm) and a photodetector on a flexible circuit to track water fraction using a Beer–Lambert model. Monte Carlo photon transport and bioheat simulations guided source–detector

geometry and confirmed thermal safety ($< 41^{\circ}\text{C}$). Device performance was validated in experiments, controlled exercise, and breath-holding paradigms, and at-home sleep recordings. Light-based data and commercial EEG data were acquired simultaneously for sleep-stage classification using a hybrid convolutional neural network–bidirectional LSTM and sigma-band thresholding. **Results:** Bioheat simulations and infrared thermography showed surface temperature stabilized at $\sim 40^{\circ}\text{C}$ after 60 min. Monte Carlo modeling demonstrated measurable photon sensitivity to CSF depth. $\Delta[\text{H}_2\text{O}]$ signals showed state-dependent oscillations during exercise and breath holding. Also, power spectral analysis identified respiratory signal (~ 0.3 Hz), slow oscillation-linked NIRS oscillation (0.6–0.7 Hz), and cardiac cycle (0.8–1.2 Hz) rhythms with stage-specific variations. Hybrid sleep-stage classification achieved 0.87 test accuracy. During natural sleep, accumulated brain water rose during transitions into NREM and declined during transitions into REM, paralleling EEG slow-wave activity.

Conclusion: The BW-NIRS device enables continuous, at-home monitoring of CSF-linked brain water dynamics and multiple physiological rhythms across sleep stages, providing a noninvasive observation of glymphatic system and potential early screening of sleep or neurodegenerative disorders.

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0361

AUTOMATED SLEEP STAGING WITH AN AT-HOME DRY-ELECTRODE EEG SYSTEM ACHIEVES OR EXCEEDS EXPERT-LEVEL PERFORMANCE

Jason Manley, Eric Hanson, Kendal Sandridge, Jack Sampiere, Antoine Guillot, Alexander Chan
Beacon Biosignals, Inc.

Introduction: Disturbed sleep is a hallmark of many neuropsychiatric conditions, yet the gold standard for assessment—in-clinic polysomnography (PSG) with staging by expert technologists—is costly, time-intensive, subject to inter-rater variability, and burdensome to patients. In this study, we evaluate the performance of Waveband, an FDA-cleared, at-home, dry-electrode EEG headband that captures sleep physiology and includes a newly updated automated sleep-staging algorithm implemented under an FDA-authorized Predetermined Change Control Plan (PCCP).

Methods: Overnight EEG headband and PSG recordings were simultaneously acquired from 38 subjects (ages 23–66; 50% female) in the OCTAVE-3 study (NCT05438017). Each 30-second epoch was scored by six registered PSG technologists following AASM guidelines, whereas the EEG headband data were scored

using the updated sleep staging algorithm. To compare human and algorithm performance, each individual expert and the updated EEG headband algorithm were independently evaluated against the weighted majority consensus of the remaining five experts. Epoch-level multi-stage and per-stage agreements were computed for each comparison.

Results: When each expert was evaluated against the consensus of the remaining raters, their overall agreements ranged from $77.6 \pm 7.3\%$ to $88.7 \pm 4.7\%$ (mean $\pm$ SD across recordings), whereas the EEG headband achieved $87.8 \pm 4.1\%$ to $89.1 \pm 3.7\%$. The EEG headband exhibited statistically greater overall agreement than two experts ($p < 0.05$, one-sided paired Wilcoxon ranked-sign test) and was not significantly different from the remaining four experts ($p > 0.05$, two-sided paired Wilcoxon ranked-sign test). Further analyses revealed comparable or improved agreement across all individual sleep stages. In particular, the EEG headband achieved higher agreement than all six experts in N1 and higher agreement than five out of six experts in REM, both of which are typically subject to greater inter-rater variability.

Conclusion: The Waveband at-home EEG system and its updated sleep staging algorithm achieve performance comparable to or exceeding that of individual human experts scoring PSG. These findings support the feasibility of accurate, scalable sleep assessment outside the laboratory and demonstrate the PCCP as an effective mechanism for continuous AI/ML improvement in FDA-cleared medical devices.

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0362

ENHANCING DEEP LEARNING SLEEP STAGING THROUGH SPECTROGRAM AUGMENTATION OF POLYSOMNOGRAPHY SIGNALS

Netiwit Kaongoen¹, Jaehyun Jeong¹, Jongseung Lee¹, Minkyung Kim¹, Jin Hyung Lee²

¹LVIS Korea, ²LVIS Corporation

Introduction: Automated sleep staging using deep learning is increasingly important for improving the efficiency and reproducibility of polysomnography (PSG) scoring. However, model performance can be constrained by the variability and limited diversity of available training data. Data augmentation offers a potential solution by artificially expanding the range of signal characteristics encountered during training, yet its impact on sleep staging performance remains underexplored. This study investigates whether applying augmentation techniques to spectrogram representations of PSG signals—including electroencephalogram, electrooculogram, and chin electromyogram—can enhance model accuracy and generalization.

Methods: Model inputs were sequences of time–frequency spectrograms computed from PSG channels recorded according to AASM standards. During training, each sequence was randomly augmented with one of five strategies: (1) no augmentation, (2) time masking, (3) frequency masking, (4) amplitude scaling, or (5) Gaussian noise. A deep learning architecture combining convolutional residual blocks and bidirectional LSTM layers was trained using full-night PSG recordings from 2,269 patients (36.71% female, 63.29% male; mean age 47.87 ± 17.48 years)

collected as part of a large clinical sleep study. Model evaluation was conducted on the ANPHY-Sleep open dataset ($N = 29$), which is entirely independent from the training cohort and differs in demographic characteristics, collection site, and recording conditions. This separation provides a stringent assessment of model generalizability and robustness across populations. Models trained with and without augmentation were directly compared under this evaluation framework.

Results: Introducing augmentation strategies during training yielded measurable improvements in sleep stage classification. The augmented model achieved higher overall accuracy (84.0% vs. 82.6%) and a higher macro F1-score (0.789 vs. 0.779) compared with the non-augmented baseline. Improvements were observed across a majority of recordings, indicating that augmentation helped the model better accommodate natural variability in PSG signals.

Conclusion: This study demonstrates that targeted augmentation strategies can meaningfully enhance spectrogram-based deep learning models for automated sleep staging. By increasing the diversity of training inputs, augmentation improved performance on an external dataset and strengthened model resilience to inter-subject and recording variability. These findings support incorporating augmentation techniques as a practical approach for advancing clinical sleep staging systems.

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0363

IMPROVING AUTOMATED SLEEP STAGING WITH DEEP LEARNING: LEARNABLE PSG CHANNEL ENCODING

Yanchen Guo¹, Yakun Zhang¹, Maciej Nowakowski², Weiying Dai¹

¹State University of New York at Binghamton, ²United Health Services Hospitals, Inc.

Introduction: Sleep scoring is essential for clinical sleep diagnostics, and recent advances in deep learning have accelerated and standardized this process. Transformer-based models such as SleepTransformer have achieved state-of-the-art performance, and our previous work, FlexSleepTransformer, further improved scoring accuracy and cross-dataset generalizability by fusing information from multiple PSG channels. However, these methods rely on fixed channel encodings that fail to capture the spatial organization of PSG electrodes, limiting their ability to model inter-channel relationships effectively. To address this limitation, we introduced a learnable 2D PSG channel encoding that explicitly represents spatial structure and integrated it into FlexSleepTransformer, leading to improved performance across multiple datasets.

Methods: A total of 543 subjects from seven independently acquired datasets were included. For each dataset, subject-level 5-fold cross-validation was performed to prevent data leakage. The baseline model followed the two-level sequence-to-sequence SleepTransformer architecture, which processed intra-epoch information and inter-epoch temporal context in a manner consistent with human scoring guidelines. Because the datasets differed in their PSG channel configurations, the model required a way to recognize each channel's spatial origin. Traditional

fixed channel encodings identified separate channels but failed to capture spatial relationships. To overcome this limitation, we introduced a learnable 2D PSG positional encoding that allowed the model to autonomously learn spatially informed representations of signals from different brain regions. Three models were evaluated across all datasets: (1) no channel encoding, (2) fixed channel encoding, and (3) the proposed learnable 2D channel encoding.

Results: Across all seven datasets, the proposed learnable 2D channel encoding achieved the highest average accuracy ($82.84\% \pm 2.08\%$), outperforming both the no-encoding model ($81.6\% \pm 1.79\%$) and the fixed-encoding model ($82.35\% \pm 1.53\%$). Statistical comparisons further showed that the learnable encoding significantly outperformed the no-encoding baseline on six datasets and outperformed the fixed encoding on four datasets, demonstrating its consistent advantage across diverse data sources.

Conclusion: We introduced a learnable 2D EEG channel encoding for Transformer-based sleep staging and successfully incorporated it into FlexSleepTransformer. Results across seven datasets demonstrated consistent and significant performance improvements, highlighting the strong potential of this approach for deployment in real clinical workflows.

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0364

EFFECTS OF A BLUE LIGHT-REDUCING LAPTOP DISPLAY AND SOFTWARE ON OBJECTIVE AND PERCEIVED SLEEP, EYE STRAIN, AND PRODUCTIVITY

Sharon Danoff-Burg¹, Holly Rus², Aislinn Beam², Henry Lopez², Morgan Weaver², Kiara Carmon², Duvia Lara Ledesma³

¹Sleep.ai, ²SleepScore Labs, powered by Sleep.ai

Introduction: Exposure to blue light in the evening can suppress melatonin and impair sleep. While prior work has shown benefits of blue light-filtering screen protectors, less is known about integrated display and software solutions that automatically reduce blue light. This study evaluated the effects of a blue light-reducing laptop display and software on both objective sleep and self-reported outcomes.

Methods: Healthy adults ($N=21$; 62% female; M age=43) who reported regular laptop use after sunset completed a 9-week, in-home, pre-post study (three 3-week phases: baseline with their own laptop, Dell XPS with Eyesafe® Display, and the same laptop with Eyesafe® Pro Software). Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period surveys assessed perceived sleep quality, eye strain, productivity, and well-restedness. Analyses used multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across > 700 nights, no significant differences in objective sleep metrics were observed. Display only: Participants reported higher sleep quality (+17%), more well-rested mornings (+19%), less eye strain (-23%), and greater productivity (+19%; all $ps < .001$). Display + software: Participants reported larger improvements: higher sleep quality (+28%), more well-rested

mornings (+27%), less eye strain (−52%), and greater productivity (+29%; all $p < .001$).

Conclusion: Although objective sleep remained stable, use of a blue light-reducing laptop display and software were associated with significant improvements in perceived sleep quality, eye comfort, and productivity, suggesting potential benefits for evening screen users.

Support (if any): Eyesafe

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0365

SUBJECTIVE-OBJECTIVE DISCREPANCIES IN SLEEP DURATION: PREVALENCE ASSOCIATED WITH SOCIODEMOGRAPHICS AND SLEEP HEALTH

Dorothy Tung¹, Michael Amadei¹, Andrea Diaz-Pacheco¹, Elizabeth F. Rasmussen¹, Patricia Molina¹, Patricia Haynes¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Girardin Jean-Louis⁴, Velarie Ansu⁴, Azizi Seixas⁴, Mascha Korsch⁴, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Miami

Introduction: Sleep duration is a key health indicator. Subjective-objective discrepancies in sleep duration have been well-documented; however, little is known about the factors shaping these discrepancies among Hispanic/Latine populations. Understanding the sociocultural and behavioral factors is important for screening accuracy as well as useful in developing culturally tailored sleep health recommendations.

Methods: Data were collected from 819 working-age adults (age 25-60) living at the US-Mexico Border. Subjective sleep duration was assessed as self-reported typical sleep hours, converted to minutes. Objective sleep duration was assessed over a 2-week period using actigraphy (Mini-MotionLogger devices) scored according to published guidelines. Discrepancy was operationalized as [subjective − objective]. Potential correlates included age, gender, education level, financial status, years living in the US, language of assessment, Anglo and Mexican acculturation, body mass index, apnea-hypopnea index (assessed using Embletta), Pittsburgh Sleep Quality Index (PSQI) score, Insomnia Severity Index (ISI) score, Brief Index of Sleep Control (BRISC) score, PHQ9 depression scale score, and GAD7 anxiety scale score. Linear regression analyses were adjusted for age and gender. A forward stepwise analysis was used to generate a parsimonious model.

Results: Self-reported sleep duration was systematically greater than actigraphic measurement with a mean discrepancy of 97.9 minutes (SD=210.1) and median discrepancy of 41.3 minutes (IQR=−24.2, 133.0). Adjusted analyses showed that subjective overestimate was associated with being male ($B=38.5$), lower PSQI ($B=-5.8$), lower ISI ($B=-5.9$), and greater perceived control ($B=17.5$). A stepwise model was significant ($p < 0.0001$) and included only (in order) ISI score ($B=-5.1$), being in the US >20 years ($B=-36.4$), PSQI score ($B=-5.5$), and poverty ($B=55.7$).

Conclusion: Adults in this US-Mexico border sample overestimated their sleep duration relative to actigraphy. This was especially true among those with fewer insomnia symptoms, better perceived sleep quality, higher perceived control, as well as males. Discrepancies in sleep duration were also shaped by socioeconomic context and acculturation. Together, these findings highlight the need for culturally informed assessment strategies and

targeted efforts that aim to reduce sleep-related disparities in Hispanic/Latine communities.

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0366

ACTIVE TEMPERATURE REGULATION DURING SLEEP IMPROVES CIRCADIAN RHYTHM, SLEEP COMPOSITION, AND CARDIOVASCULAR RECOVERY IN OLDER ADULTS

Sofie Jacobsen, Megan Holm, Emma Cary, Breanne Wilhite, David He, Nicole Moyen
Eight Sleep Inc.

Introduction: Sleep quality declines with age, potentially resulting from a blunted circadian rhythm of core body temperature (Tc), which can reduce deep sleep and cardiovascular recovery. Cooling during early hours of sleep with high-heat capacity mattresses lowers Tc and heart rate (HR) and increases deep sleep in postmenopausal women, suggesting whole-night active temperature regulation (ATR) might further enhance Tc rhythms and sleep-related cardiovascular recovery. We evaluated how continuous ATR affects circadian rhythm, cardiovascular recovery, and sleep composition in older adults.

Methods: 90 participants ($n=60$ postmenopausal women and $n=30$ age-matched men; mean $\pm$ SD: 55 $\pm$ 5 y) slept on the Eight Sleep Pod, a mattress cover enabling ATR throughout the night, for 7 nights each with ATR OFF vs. ON. Sleep stages, HR, and heart rate variability (HRV) were measured nightly with smart rings, and Tc was measured via gastrointestinal pills. Linear mixed-effects models analyzed nightly outcomes (means $\pm$ SE reported below), Pearson's correlation coefficient and linear models analyzed participant-level changes between ATR conditions, and single-harmonic cosinor analysis analyzed Tc rhythms.

Results: On average, ATR decreased sleeping HR by 3% (-1.8 ± 0.3 bpm), increased HRV by 11% ($+3.6\pm0.6$ ms), and reduced Tc by $-0.16\pm0.01^\circ\text{C}$. ATR ON lowered Tc mesor, the 24-hour average, by $-0.07\pm0.01^\circ\text{C}$ and increased Tc amplitude by $+0.07\pm0.02^\circ\text{C}$ (all $P < 0.001$), indicating improved circadian rhythm. Larger decreases in Tc from ATR OFF to ON correlated with greater HR improvements ($r=0.34$, $P=0.037$). Using cooler ATR temperatures corresponded with larger HRV increases ($r=-0.31$, $P=0.004$). ATR ON improved sleep composition for participants with poor sleep composition at baseline (i.e., average light sleep >65.0%, deep sleep < 13.7%, REM sleep < 21.3% or wake after sleep onset >9.5%; all $P < 0.05$).

Conclusion: To our knowledge, this is the first evidence that ATR can lower Tc in adults 55+ years, thereby improving Tc circadian rhythm. These circadian-rhythm improvements enhanced cardiovascular recovery and sleep composition. As sleep quality is reduced with aging, ATR during sleep can be an excellent non-pharmacological solution to restore sleep health in older adults.

Support (if any): This research was funded by Eight Sleep Inc.

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0367

BREATH-BIOMARKERS OF RESPIRATORY EXACERBATION IN ASTHMATIC CHILDREN THROUGH SLEEP HEALTH

Yu Huang¹, Arthur Owora¹, Jiang Bian¹, Anuja Bandyopadhyay²

¹Indiana University, ²Indiana University School of Medicine

Introduction: Asthma is a chronic lung disease affecting 6.5–10% of children and severe asthma exacerbations are often preceded by a period of poor asthma control, suggesting a window for preventive intervention. There is no reliable method to predict asthma exacerbation. Sleep disruption is a common complaint among children with asthma. Polysomnography (PSG) is routinely used in this population to assess for sleep disordered breathing and captures brain, heart, and respiratory signals for 6–9 hours. Our preliminary data suggests that sleep fragmentation, noted on PSG, is associated with severe asthma exacerbation within the following year. However, till date, sleep microstructures have not been studied to identify the children at risk for asthma exacerbation.

Methods: Retrospective cohort analysis to identify correlates and quantify the prognostic utility of poor sleep microstructures, utilizing machine learning approaches, associated with increased risk of severe asthma exacerbation event (SE) 12-months post a sleep study. We extracted microstructural features, including spectral band power statistics, interhemispheric coherence, and temporal statistics, from multi-modality physiological signals across sleep stages (wake, N1, N2, N3, REM). We implemented two machine learning models (e.g., XGboost and Lasso) with 10-fold cross-validation. We applied Explainable AI (i.e., SHAP) to identify the most predictive microstructural features for SE risk.

Results: The study cohort included 160 patients (36% female, 33% African American, mean age of 10 ± 4 years). The XGBoost model demonstrated good discriminative performance for predicting 1-year SE risk (C statistic = 0.72 ± 0.14). SHAP analysis revealed that gamma-band interhemispheric EEG coherence (T5–T6) during wake was the strongest predictor (mean |SHAP| = 0.57 ± 0.15). Other contributory features included delta-band EEG kurtosis in N1 (0.38 ± 0.11), a temperature-derived flow limitation index during wake (0.29 ± 0.18), and beta-band EEG kurtosis in N3 (0.29 ± 0.14). Electromyogram (EMG) and Electrooculogram (EOG) features also contributed substantially, e.g., including N1 high-frequency EMG power and N1 REM-related EOG power.

Conclusion: Sleep microstructural features that typically cannot be scored manually are different in children with and without asthma exacerbation within the following year. These microstructure measures may signify subclinical features of sleep fragmentation and respiratory effort disruption and offer accurate prognosis for targeted prevention interventions.

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0368

REAL-TIME SLEEP STAGE AND EEG FEATURE DETECTION FOR CLOSED-LOOP NEUROMODULATION

Cameron Good, Antony Passaro, Ehsan Dadgar-Kiani, Kristy Meads
Attune Neurosciences

Introduction: Closed-loop neuromodulation based on streaming EEG requires real-time algorithms to continuously run as new data samples are collected, and the system must react with millisecond precision to time stimulation with detected features. To address this, we developed a comprehensive real-time EEG signal processing pipeline consisting of automated on-line artifact

rejection, sleep staging, and slow-wave and spindle detection, along with control logic for triggering external neuromodulation systems.

Methods: We used the STAGES dataset (1,687 polysomnograms) to develop our algorithms. We manually labeled artifact containing sleep epochs to develop a threshold-based approach to rejection. We then defined a set of parameters to identify slow waves and spindles as they occur in real-time, along with opportunities for personalized models. An XGBoost machine learning (ML) model was used to implement automated sleep staging capable of running in a real-time manner. Lastly, we developed a predictive model of the upcoming (future) sleep stage of the next epoch of EEG data.

Results: The artifact rejection threshold value can be adjusted to be less or more restrictive on data quality used for analysis. For example, one can reject more data by reducing the threshold to lower values, which flags more epochs as contaminated by noise and provides a cleaner (but reduced) dataset. The sleep stage model analyzes 10 seconds of EEG data then predicts the future 10 second epoch and runs again 10 seconds later. EEG feature calculations take < 5 ms to run. Our algorithms can detect 81.4 % of slow waves prior to the negative peak (270-degrees, mean = 246.2 degrees). A second real-time slow wave and spindle detection model relies on obtaining a minimum of 1-night's sleep recording for individualized neuromodulation.

Conclusion: We combined these algorithms (artifact rejection, sleep staging, and slow-wave and spindle detection) into a closed-loop workflow that allows one to time neurostimulation at any point and define timeout periods for safety. The approach was validated using a separately developed custom software application to visualize pre-recorded EEG data as if it were being actively recorded. All code is written in Python to accommodate further modification and enhancements.

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0369

STATE-DEPENDENT COUPLING: DIFFERENTIAL ROLES FOR MICROAROUSALS IN NREM GLYMPHATIC DYNAMICS

Srija Seenivasan¹, Sujasha Gupta¹, J. Kent Werner²

¹Uniformed Services University, ²Uniformed Services University of Health & Sciences

Introduction: Recent evidence highlights that noradrenergic (NE) fluctuations from the locus coeruleus drive infraslow neurovascular oscillations, which are essential for regulating glymphatic clearance. Microarousals (MAs) correlate with these NE surges and glymphatic activity, suggesting they may have a beneficial physiological role. This study examines the relationship between MAs and fluid dynamics across sleep stages in human sleep, distinguishing between spontaneous and apnea-related events.

Methods: Polysomnogram and noninvasive functional near-infrared spectroscopy (fNIRS) measured sleep stages and frontal cortex water concentrations. A custom automated pipeline filtered and labeled manually scored microarousals within 10 seconds of apneic events as apneic MAs to separate them from spontaneous MAs.

Results: Preliminary analysis reveals a biphasic relationship: In N2, increased MAs positively correlate (Pearson $r = 0.68$, $p = 0.011$) with water concentration, suggesting a regulatory role of MAs for clearance initiation. In N3, the relationship reverses, with MAs negatively correlating (Pearson $r = -0.53$, $p = 0.185$) with water concentration, suggesting an overall disruptive effect on deep sleep clearance. Significantly, pooling N2 and N3 data markedly reduces the correlation (Pearson $r = 0.21$, $p = 0.484$). This cancellation suggests that MAs serve different roles depending on the sleep stage. The negative N3 correlation is likely skewed by pathogenic, apneic MAs, which inhibit flow and dominate the signal.

Conclusion: Our findings demonstrate that the coupling between MAs and water flux is sleep stage-dependent, with MAs potentially driving flux in N2 but disrupting in N3. The attenuation of this effect when both stages are combined strongly supports the hypothesis that N2 MAs may be supportive of restorative sleep events, similar to spindles, while N3 MAs serve as disruptors to low-frequency-linked clearance. Future work will isolate spontaneous versus apneic MAs, which will clarify how neurovascular coupling, consistent with the NE mechanism, drives deep sleep. Furthermore, we will analyze the temporal distribution of water flux immediately preceding and following spontaneous MAs to characterize the mechanism of NE-driven slow oscillations and waste clearance.

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0370

CLINICAL VALIDATION OF CARDIAC RHYTHM MONITORING USING A WEARABLE DRY-ELECTRODE HOME SLEEP TEST DEVICE

Yizhaq Shmayahu¹, Deganit Barak-Shinar¹, Daniel Possti¹, Rona Haker¹, Avshalom Shaffer², Yael Hanein³, Shai Tejman Yarden²
¹X-Trodes Ltd., ²Sheba Medical Center, ³Tel-Aviv University

Introduction: Wearable, low-form-factor neurophysiologic sensors are reshaping sleep medicine by enabling high-fidelity home-based monitoring that more closely reflects natural sleep behavior, improving comfort, expanding accessibility, and reducing system-level costs. Their broad clinical adoption, however, requires rigorous evidence that wearable platforms can deliver measurements equivalent to gold-standard wired, gel-electrode systems. Recent studies have shown that dry-electrode wearables can faithfully capture key neurophysiologic features, including sleep staging, spindle detection and morphology, and REM Sleep Without Atonia (RSWA) scoring. Yet one essential domain remains critically underexplored: the fidelity of cardiac rhythm acquisition, particularly in patients with underlying cardiac disease. Here, we address this gap by directly comparing cardiac rhythm acquisition between a wearable dry-electrode sleep system and a conventional wired, gel-electrode platform in a cohort of cardiac patients.

Methods: We conducted a prospective comparison of cardiac rhythm monitoring using an FDA-cleared wearable system

(X-trodes System M) and a gold-standard wired platform (Biopac). Consecutive adult patients were enrolled through the cardiology clinic at Sheba Medical Center, Israel. The wearable system uses ultrathin printed dry-electrode arrays embedded in small wireless adhesive patches to record EEG, ECG, EOG, and EMG. The platform is modular, supports optional respiratory sensors, and enables multi-night and multi-subject recordings.

Results: Seven patients were enrolled (median age 78). Cardiac histories included aortic stenosis ($n=2$), mitral regurgitation ($n=1$), ischemic heart disease ($n=3$), and Wolff-Parkinson-White ($n=1$). Conduction abnormalities included LBBB ($n=1$), RBBB ($n=1$), WPW ($n=1$), and first-degree AV block ($n=1$). One patient had atrial fibrillation. A total of 1,349 beats were available for RR analysis and 1,168 for PR, the discrepancy due to an AF episode. RR intervals showed < 1 ms mean error, SD ± 2.8 ms, and MAE 1.5 ms. PR intervals showed 1.8 ms mean error, SD ± 9.1 ms, and MAE 4.6 ms.

Conclusion: This study demonstrates that wearable dry-electrode technology can achieve RR and PR interval measurements equivalent to gold-standard wired systems, supporting its feasibility for cardiac rhythm monitoring during home sleep testing. These findings extend emerging evidence that next-generation home sleep platforms can deliver clinically reliable electrophysiologic data in complex cardiac populations.

Support (if any):

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0371

AT-HOME MONITORING OF THE GLYMPHATIC SYSTEM DURING SLEEP USING A WEARABLE NIRS-EEG DEVICE

Olivia Kierul¹, Larry Padilla¹, Kuan Cheng Wu², Marco Renna¹, Nikola Otic¹, Zachary Starkweather¹, Gayathri Vijayaraghavan¹, David Salat¹, Giorgio Bonmassar³, Shadab Rahman⁴, Maria Angela Franceschini¹, Mitchell Robinson¹

¹Massachusetts General Hospital, ²Athinoula A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, ³A.A. Martinos Center, Massachusetts General Hospital, Harvard Medical School, ⁴Brigham and Women's Hospital and Harvard Medical School

Introduction: The glymphatic system (GS) clears metabolic waste from the brain and is active during slow-wave sleep. Impaired glymphatic function has been linked to cognitive decline and neurodegenerative diseases. Current assessment methods rely on magnetic resonance imaging (MRI), which cannot capture GS dynamics under naturalistic at-home conditions. To address these limitations, we developed the GS-FlexNIRS+, a wearable device that combines near-infrared spectroscopy (NIRS) and electroencephalography (EEG) for noninvasive measurements of vascular and neural signals associated with glymphatic activity during sleep at home.

Methods: The GS-FlexNIRS+ integrates 10 EEG, 2 electrooculography (EOG), and 2 electromyography (EMG) channels measuring at 250 Hz, with a 9-wavelength (740–1050nm) LED 50 Hz NIRS probe on a lightweight, flexible, forehead-mounted circuit. The device records EEG activity for slow wave activity monitoring and sleep staging, as well as hemoglobin and water-sensitive optical changes. The system is wireless, battery-powered, and

operated through a tablet application providing instructions for self-testing. The NIRS detects hemodynamic activity linked to glymphatic function, and in-lab validation confirmed stable overnight NIRS/EEG recordings with clear identification of these glymphatic-related rhythms.

Results: Initial pilots in small groups demonstrated the feasibility of self-administration and stable overnight signals, as all EEG electrodes maintained constant impedance ($< 20k\Omega$), and NIRS showed good SNR and overall stability. Wearability surveys confirmed comfort and ease of use, supporting progression to large-scale home use.

Conclusion: The GS-FlexNIRS+ provides a novel and feasible method for at-home monitoring of sleep-related GS function. The NIGHT-Study, starting December 2025, will evaluate feasibility in a large cohort (target enrollment $n=120$, 80 females, ages 40–60) who will self-deploy the device at home for up to five nights following in-person training in addition to cognitive testing and blood-based biomarkers, and measures including actigraphy, daily sleep diaries, self-reported sleep quality, and menopausal symptoms surveys for female participants. Preliminary data from these measurements will be available for the conference in June. This work will enable large-scale evaluation of glymphatic function, including exploration of how sex and the menopausal transition influence GS activity, with the long-term goal of informing early interventions for neurodegenerative diseases such as Alzheimer's.

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0372

EFFECTS OF USING A COIL MATTRESS ON OBJECTIVELY MEASURED AND SELF-REPORTED SLEEP

Morgan Weaver¹, Sharon Danoff-Burg², Holly Rus¹, Aislinn Beam¹, Kiara Carmon¹, Sophia Markowitz¹, Duvia Lara Ledesma¹

¹SleepScore Labs, powered by Sleep.ai, ²Sleep.ai

Introduction: Comfort and support are essential components of sleep quality, and mattress design can directly affect both. Empirical evidence examining specific mattress types and their impacts on objective and perceived sleep outcomes remains limited. This study evaluated sleep on a mattress with precision fit coils compared to participants' baseline sleep on their original mattresses.

Methods: Healthy adults ($N=31$; 84% female; M age=45) who reported difficulty falling or staying asleep participated in a 10-week in-home field study using a pre-post design. Participants slept on their original mattresses for four weeks, followed by six weeks on a Sealy Posturepedic or Posturepedic Plus Mattress, including a two-week adjustment period. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period questionnaires assessed perceived sleep outcomes. Analyses included multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across 1,161 tracked nights, there were significant increases in objectively measured time in bed (+3.1%), sleep duration (+3.3%), light sleep (+5.0%), proportion of the night in light sleep (+2.4%), and BodyScore (+1.4%), a measure of age- and gender-normalized deep sleep. Although a lower proportion of the night was spent in REM sleep (-5.8%) the number of minutes spent

in REM sleep did not change significantly. Participants reported fewer aches and pains (-44%) as well as improvement in numerous perceived sleep outcomes, including ease of falling asleep (+58%), fewer nights of tossing and turning (-40%), better sleep quality (+88%), sleep satisfaction (+112%), and feeling well-rested upon waking (+88%). Participants also reported increases in comfort (+57%), support (+95%), and pressure relief (+167%). All $ps<.05$.

Conclusion: Sleeping on a coil mattress was associated with improved objective sleep and many self-reported benefits, including greater comfort, support, and perceived sleep quality compared to participants' original mattresses.

Support (if any): Mattress Firm INC.

Abstract citation ID: zsa091.0373

0373

EFFECTS OF USING A HYBRID COOLING MATTRESS ON OBJECTIVELY MEASURED AND SELF-REPORTED SLEEP

Kiara Carmon¹, Sharon Danoff-Burg², Holly Rus¹, Aislinn Beam¹, Morgan Weaver¹, Sophia Markowitz¹, Duvia Lara Ledesma¹

¹SleepScore Labs, powered by Sleep.ai, ²Sleep.ai

Introduction: Comfort, support, and temperature regulation are critical contributors to sleep quality. Hybrid mattresses that combine pressure relief and cooling technologies may reduce nighttime discomfort and enhance sleep quality. This study compared sleep on a hybrid cooling mattress to participants' baseline sleep on their original mattresses.

Methods: Healthy adults ($N=33$; 78% female; M age=42) who reported sleeping hot, experiencing night sweats or hot flashes, and/or nighttime discomfort completed a 10-week in-home pre-post study. Participants slept on their original mattresses for four weeks, followed by six weeks on the Sealy Posturepedic Elite Hybrid Mattress, including a 2-week adjustment period. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period surveys assessed perceived sleep-related outcomes. Analyses used multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across 1,159 tracked nights, participants showed multiple objective improvements while sleeping on the hybrid cooling mattress, including faster sleep onset (5 minutes faster; -18%), longer sleep duration (+4%), and better sleep efficiency (+2%). Participants also experienced more REM sleep (+6%), deep sleep (+8%), and light sleep (+2%), alongside increases in SleepScore (age- and gender-normalized overall sleep quality; +3%), MindScore (age- and gender-normalized REM sleep; +3%), and BodyScore (age- and gender-normalized deep sleep; +3%). All $ps<.05$. Self-reported outcomes showed substantial perceived benefits: greater comfort (+186%), support (+194%), pressure relief (+266%), and coolness (+295%), as well as fewer nights per week of tossing and turning (-60%) and fewer aches and pains (-57%). Participants also reported improvements in subjective ease of falling asleep (+129%), perceived sleep quality (+150%), sleep satisfaction (+178%), and feeling well-rested in the morning (+133%). All $ps<.05$.

Conclusion: Sleeping on a hybrid cooling mattress was associated with faster sleep onset, improved sleep architecture, greater sleep

efficiency, and broad perceived improvements in comfort, support, and overall sleep quality compared to participants' original mattresses.

Support (if any): Mattress Firm INC.

Abstract citation ID: zsag091.0374

0374

EFFECTS OF USING A LATEX FOAM MATTRESS ON OBJECTIVELY MEASURED AND SELF-REPORTED SLEEP AND PAIN OUTCOMES

Holly Rus¹, Sharon Danoff-Burg², Aislinn Beam¹, Henry Lopez¹, Morgan Weaver¹, Kiara Carmon¹, Sophia Markowitz¹, Duvia Lara Ledesma¹

¹SleepScore Labs, powered by Sleep.ai, ²Sleep.ai

Introduction: Mattress comfort and support are essential contributors to sleep quality, yet empirical field studies remain limited. This study compared sleep on a latex foam mattress to participants' baseline sleep on their original mattresses.

Methods: Healthy adults (N=34; 79% female; M age=44) who reported difficulty falling or staying asleep, frequent awakenings, or nighttime discomfort participated in a 10-week in-home pre-post study. Participants slept on their original mattresses for four weeks, followed by six weeks on a Serta iComfort PRO Mattress (multiple firmness and pillow-top levels), including a two-week adjustment period. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period questionnaires assessed pre-post subjective outcomes. Analyses used multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across more than 1,500 tracked nights, participants fell asleep faster on the latex foam mattress compared to their original mattress, with a 3-minute shorter average sleep onset latency (-9%; $p=.04$). They also experienced higher BodyScore (+2%; $p=.02$), indicating improved age- and gender-normalized deep sleep; however, deep sleep did not change when measured in minutes or proportion of the night. Self-reported outcomes showed broad improvements (all $ps<.05$): more nights of comfort (+112%), support (+184%), mattress coolness (+179%), perceived sleep quality (+143%), and sleep satisfaction (+112%). Participants reported fewer nights of tossing and turning (-48%) and fewer aches and pains (-41%). Perceived ease of falling asleep (+46%), feeling well-rested (+94%), and feeling refreshed (+98%) also significantly improved.

Conclusion: Using a latex foam mattress was associated with objective improvements including faster sleep onset and substantial self-reported benefits including perceptions of decreased pain and increased sleep quality.

Support (if any): Serta Simmons Bedding, LLC

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0375

EFFECTS OF USING A PREMIUM COOLING MATTRESS ON OBJECTIVELY MEASURED AND SELF-REPORTED SLEEP

Kiara Carmon¹, Sharon Danoff-Burg², Holly Rus¹, Aislinn Beam¹, Morgan Weaver¹, Sophia Markowitz¹, Duvia Lara Ledesma¹

¹SleepScore Labs, powered by Sleep.ai, ²Sleep.ai

Introduction: Comfort and temperature regulation play essential roles in sleep quality. Mattresses that provide enhanced cooling, support, and pressure relief may help improve sleep continuity and restfulness. This study compared sleep on a premium cooling mattress to participants' baseline sleep on their original mattresses.

Methods: Healthy adults (N=19; 94% female; M age=40) who reported sleeping hot or experiencing nighttime temperature discomfort participated in a 10-week in-home pre-post study. Participants slept on their original mattresses for four weeks, followed by six weeks on a Sealy Posturepedic Elite Mattress, including a two-week adjustment period. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period surveys assessed perceived comfort, pressure relief, cooling, support, tossing and turning, pain, and overall sleep quality. Analyses included multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across 699 tracked nights, participants spent more time in bed (+3%) and showed significant objective improvements in total sleep duration (+5%), SleepScore (age- and gender-normalized overall sleep quality; +4%), MindScore (age- and gender-normalized REM sleep; +6%) and REM sleep (+14%). They also exhibited higher sleep efficiency (+2%), greater sleep maintenance (+2%), fewer awakenings (-8%), and less time awake after sleep onset (-16%). All $ps<.05$. Self-reported outcomes improved substantially, including comfort (+124%), support (+177%), pressure relief (+283%), cooling (+175%), and sleep quality (+226%), along with reduced tossing and turning (+199%) and aches and pains (-52%). Participants also reported higher sleep satisfaction (+230%) and feeling well-rested in the morning (+200%) All $ps<.05$.

Conclusion: Sleeping on a premium cooling mattress was associated with significant objective and self-reported improvements in sleep quality, comfort, and perceived cooling compared to participants' original mattresses.

Support (if any): Mattress Firm INC.

Abstract citation ID: zsag091.0376

0376

EFFECTS OF USING A SPRING MATTRESS ON OBJECTIVELY MEASURED AND SELF-REPORTED SLEEP

Holly Rus¹, Sharon Danoff-Burg², Aislinn Beam¹, Morgan Weaver¹, Kiara Carmon¹, Sophia Markowitz¹, Duvia Lara Ledesma¹

¹SleepScore Labs, powered by Sleep.ai, ²Sleep.ai

Introduction: Research has shown that comfort, including the comfort of the mattress, is essential to sleep quality. In addition to comfort, factors such as pressure relief and temperature regulation contribute to how restorative sleep feels. This study compared sleep on a spring mattress to participants' baseline sleep on their original mattresses.

Methods: Healthy adults (N = 60; 71% female; M age = 45) who reported nighttime awakenings or discomfort during sleep participated in a 10-week in-home field study using a pre-post design. Participants slept on their original mattresses for four weeks, followed by six weeks on a Sleepy's by Sealy Spring Mattress, including a two-week adjustment period. Objective sleep was measured nightly using a PSG-validated, noncontact biomotion device, SleepScore Max. Daily and end-of-period surveys assessed

perceived comfort, support, pressure relief, cooling, pain, tossing and turning, and sleep quality. Analyses included multilevel regression and paired t-tests ($\alpha=.05$).

Results: Across 2,242 tracked nights, participants showed objective improvement in sleep architecture: a 2% increase in the proportion of the night spent in deep sleep and a 2% reduction in light sleep compared to baseline. Self-report data revealed numerous perceived benefits, including fewer aches and pains (-45%) and increases in mattress coolness (+91%), comfort (+48%), support (+100%), and pressure relief (+133%). Participants also reported fewer nights per week spent tossing and turning (-40%), better perceived sleep quality (+88%), sleep satisfaction (+102%), and feeling well-rested in the morning (+86%). All p s < .05.

Conclusion: Sleeping on a spring mattress was associated with an increase in deep sleep duration and numerous self-reported benefits, including greater comfort, support, and sleep satisfaction compared to participants' original mattresses.

Support (if any): Mattress Firm INC.

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0377

THE MODULAR ACTIGRAPHY PLATFORM FOR RAW WEARABLE SENSOR DATA PROCESSING AND SLEEP ESTIMATION

Pin-Wei Chen, Dipriya A. Pillai, Michael S. Campagna, Catherine Avitabile, Sara King-Dowling, Stephanie Mayne, Scott M. Haag, Jonathan Mitchell
Children's Hospital of Philadelphia

Introduction: Adequate sleep is essential for childhood development, yet wearable-based assessments often depend on proprietary algorithms. To enhance reproducibility, the field is moving toward open-source solutions. We developed the Modular Actigraphy Platform (MAP), an open-source tool that makes processing raw data easier and efficient. This study evaluates MAP's performance using pediatric sensor data.

Methods: MAP is deployed on Google Cloud Platform and comprises four core modules: (1) data pre-processing, (2) non-wear detection, (3) sleep scoring, and (4) physical activity scoring. Each module is Docker-containerized, with Google Kubernetes Engine providing orchestration and Argo to manage workflow execution. The pipeline incorporated the GGIR algorithm and the Monitor Independent Movement Summary (MIMS) algorithm to process raw data for sleep and physical activity estimation. To demonstrate performance, we processed tri-axial acceleration wrist-worn data from ActiGraph and GENEActiv devices and compared MAP's outputs to offline data processing benchmarks. Testing included unit, integration, and system checks, followed by alpha and beta testing. The goal of alpha testing was to evaluate MAP in a development environment. Alpha testing used 17 CHOP-generated files (4.9 GB, 1–14 days). Beta testing assessed functionality and scalability on real-world datasets from four cohort studies (686 files, each with up to 4 days of data at a 30–50 Hz sampling rate).

Results: MAP passed unit testing for stability, functionality, and security. Preprocessing was the most computationally demanding module, requiring 41–61% of the total processing time. Beta

testing required up to 60 CPUs and 120 GiB memory for preprocessing and 40 CPUs/100 GiB for the other modules. The memory-to-CPU ratio was critical for avoiding crashes. Performance evaluations showed that MAP was faster than offline processing. The offline GGIR pre-processing was 1.6 to 2.9 times slower compared to MAP. MIMS processing was most resource-intensive, requiring up to 20 CPUs and 500 GiB of memory. For MIMS unit processing, MAP processed 243.3 GB in 444 minutes versus 6007 minutes offline (2.4–14× faster).

Conclusion: Raw actigraphy data increasingly support sleep estimation but require advanced expertise. MAP reduces barriers by offering an accessible, efficient cloud-based solution for deriving sleep metrics from raw sensor data.

Support (if any):

Abstract citation ID: zsag091.0378

0378

AIRFLOW ESTIMATION DURING SLEEP USING ABDOMEN MOVEMENT AND BREATHING SOUND

Thi Hang Dang¹, Young-mi Huh², Sukmin Lee², Hee-in yoon³, Franklin Bien³

¹Ulsan National Institute of Science and Technology, ²Ulsan National Institute of Science and Technology, SB Solutions Inc., ³Ulsan National Institute of Science and Technology, Department of Electrical Engineering

Introduction: Accurate airflow measurement is essential in sleep monitoring. Although accelerometers paired with tracheal breath sounds have shown potential as alternatives to airflow sensors, accelerometer signals are frequently affected by artifacts from non-respiratory movements. Capacitive sensors offer a more direct and potentially reliable method for capturing respiratory motion. This study develops an algorithm for airflow estimation by combining capacitive signals from a wireless abdomen-worn sensor (Soom) with breathing sounds recorded via a microphone.

Methods: Ninety-seven participants underwent overnight polysomnography (PSG). Data were simultaneously collected from three sources: the Soom sensor (5 Hz), a microphone (8,000 Hz), and the nasal pressure channel (50 Hz). All obtained signals were time-synchronized. The Soom device captured capacitance and tri-axial accelerometer measurements, which were pre-processed and used as inputs for our previously established apnea detection model. A sound envelope was derived from the audio recording using the short-time Fourier transform. The sound envelope and nasal pressure were resampled to 5 Hz. Synchronized signals were segmented into one-minute intervals, normalized, and labeled as normal (no apneas) or abnormal (≥ 10 seconds of apneic events). Airflow was estimated from capacitance using a linear regression model and, during abnormal periods, further refined using the sound envelope to better capture airflow reduction. The estimated airflow was evaluated against nasal pressure using repeated-measure correlation (r) and mean squared error (MSE).

Results: The proposed algorithm demonstrated moderate performance in airflow estimation, with $r = 0.74 \pm 0.17$ and $MSE = 0.45 \pm 0.31$. In normal segments, r and MSE were 0.8 ± 0.15 and 0.42 ± 0.29 , respectively. In abnormal events, these values were 0.65 ± 0.15 and 0.63 ± 0.29 , respectively.

Conclusion: This study presented an effective algorithm that combines capacitive and sound data to estimate airflow, potentially enabling improved respiratory event classification in home sleep apnea testing without the need for nasal pressure.

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0379

INFERRING POSSIBLE CAUSAL RELATIONSHIPS AMONG POLYSOMNOGRAPHY SIGNALS USING MULTI-MODAL CAUSAL REPRESENTATION LEARNING

Yuewen Sun¹, Boyang Sun¹, Anirudh Mazumder², Haoyue Dai³, Aneesh Mazumder⁴, M. Brandon Westover⁵, Robert Thomas⁵, Kun Zhang³, Haoqi Sun⁵

¹Mohamed bin Zayed University of Artificial Intelligence, ²Stanford University, ³Carnegie Mellon University, ⁴Harvard University, ⁵Beth Israel Deaconess Medical Center

Introduction: Sleep contains rich physiology that reflects the underlying multi-organ network biology. For example, obstructive sleep apnea leads to hypoxemia, cortical arousal, and sympathetic activation. However, inferring how physiologic signals influence each other remains challenging. We applied a novel causal representation learning (CRL) framework to uncover directed physiologic dependencies in sleep, providing data-driven insight into multi-organ dynamics.

Methods: We analyzed 2,576 participants from the Sleep Heart Health Study visit 2, which is a multi-center community cohort study with at-home polysomnography (PSG). We segmented the signals into 16-second epochs. Within each epoch, we extracted band powers averaged between C3-M2 and C4-M1 from electroencephalography (EEG); standard deviation (SD) of left minus right electrooculography (EOG); average envelope of chin electromyography (EMG); average and SD of heart rate from electrocardiography (ECG); average respiration rate from the airflow thermistor; and average SpO₂. For each participant, CRL estimated a directed interaction graph among signals. This approach identifies plausible directionality (e.g., airflow→EEG) while permitting physiologic cyclic patterns. Associations between interaction frequency and age, body mass index (BMI), and apnea-hypopnea index (AHI) were tested separately in NREM and REM.

Results: The average age was 67.5 years, and 54% female. The relationships observed in more than half of the participants were airflow↔EEG (52%) and airflow→EMG (50%). During NREM sleep, older age was associated with a greater presence of airflow→EEG (t-test $p < 0.05$); higher BMI with more EEG→EMG, SpO₂→EMG (both $p < 0.01$); higher AHI with more bidirectional SpO₂↔ECG and EEG→SpO₂ (all $p < 0.001$). During REM sleep, older age with more SpO₂→airflow, EEG→ECG, and EOG→EEG (all $p < 0.05$); higher BMI with more airflow→SpO₂, airflow→EMG, and ECG→EMG (all $p < 0.001$); higher AHI with more airflow↔SpO₂ and SpO₂→EMG (all $p < 0.001$).

Conclusion: This novel and pioneering application of CRL in extracting plausible physiological interactions from polysomnography signals, including cyclic relationships. The findings align with known interactions in apnea and show differences between NREM and REM. A current limitation is that we lack the description of whether a signal exerts a positive or inhibitory influence on another signal. Validation in interventional settings, such as CPAP titration, is needed to confirm causal mechanisms.

Support (if any): AASM Foundation 370-SR-25.

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0380

ASSOCIATIONS BETWEEN DAYTIME NAPPING AND SLEEP QUALITY IN TAIWANESE ADULTS: A NATIONAL REPRESENTATIVE SURVEYCatriona Wu¹, Kening Jiang², Hsin-Chien Lee³, Adam Spira²¹School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan, ²Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, ³Graduate Institute of Medical Humanities, College of Humanities & Social Sciences, Taipei Medical University, Taipei, Taiwan

Introduction: Napping practices vary across cultures. Western societies often view naps negatively, whereas Asian and Mediterranean cultures regard them as beneficial for health. Given this cultural context, we examined the associations of napping characteristics and sleep quality among adults in Taiwan.

Methods: We studied 1,596 adults aged 18 and older who participated in the nationally representative 2021 Taiwan Social Change Survey (TSCS). Participants were asked to report the duration of their naps and to rate their sleep quality. We categorized participants as non-nappers and nappers and further classified nappers by short (≤ 60 minutes) or long (> 60 minutes) nap duration. We dichotomized sleep quality as poor (very bad) vs. better (very good, fairly good, fairly bad), with the “better” category as the reference. We used logistic regression models to examine odds ratio (OR) of poor sleep quality by napping duration, adjusting for sociodemographic, socioeconomic, health, and health behaviors.

Results: Approximately half of Taiwanese adults (51.2%) did not nap, 39.3% were short nappers (≤ 60 minutes), and 9.5% were long nappers (>60 minutes). Nappers were more likely to be older, male, married, and live in rural areas, with lower income and education. Although nappers reported more positive health behaviors (e.g., regular exercise and less smoking or binge drinking), they had poorer physical health, reflected by more chronic conditions and lower 12-item Short-Form Health Survey physical component and self-rated health scores. After adjusting for sociodemographic, socioeconomic, health, and health behaviors, short nappers were significantly less likely than non-nappers to have poor sleep quality (OR = 0.56, 95% CI = 0.35–0.87). There were no significant differences in sleep quality comparing long nappers to non-nappers (OR = 0.81, 95% CI = 0.42–1.55).

Conclusion: In Taiwan, napping is widely practiced, and short naps may be linked to improved sleep quality in this context. This suggests that when examining napping and its association with health outcomes, cultural context matters and may lead to different public health messages across populations.

Support (if any): This work was supported by the Taiwan National Science and Technology Council (NSTC 114-2813-C-038-097-B).

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0381

PROSPECTIVE ASSOCIATIONS OF NIGHTLY CALL VOLUME WITH ACTIGRAPHIC SLEEP MEASURES IN OPERATIONAL FIREFIGHTERS ON DUTYMariana Szklo-Coxe, Christen Dunn, Amanda Banaag
Old Dominion University

Introduction: Given the dearth of prospective research on shift-work exposures and objective sleep in firefighters, this study aimed to characterize sleep characteristics of firefighters and their associations with nightly call volumes during 24-hour shifts.

Methods: Actigraphy(Philips Spectrum Plus)-assessed sleep and nightly call volume from daily diaries were completed by thirty-two firefighters (across six stations), each followed twenty-one days. Generalized estimating equations linear regressions estimated unadjusted and adjusted associations between on-duty nightly call volume (after 10pm; categorized as no/low[0-2] (reference), average[3-4], high[≥ 5]), and actigraphically-assessed longest on-duty sleep period measures- sleep latency(SL), total sleep time(TST), wake after sleep onset(WASO), and sleep efficiency(SE). Robust Poisson regression models estimated unadjusted and adjusted relative risks (RR) for SL< 8min (vs. ≥ 8 min), TST ≤ 134 min ([25th percentile] vs. > 134 min), WASO > 24.5 min ([> 75 th percentile] vs. ≤ 24.5), and SE $\leq 80\%$ (vs. $> 80\%$) for average and high nightly call volumes versus no/low. Regression models were adjusted for age and station.

Results: 245 on-duty person-days (of 657 person-days) of actigraphic and diary data from February-May 2025 were analyzed. Cohort was 91% male; median age was 43.5 years (IQR=15), with mean 9.34 (SD=2.39) work-days per participant. On-duty sleep measure prevalences (95% CI) were: SL< 8min(49.4% [43.1-55.7%]), TST ≤ 134 min(26.2%[20.6-31.7%]), WASO > 24.5 min (21.6%[16.4-26.8%]), and SE $\leq 80\%$ (33.5%[27.5-39.4%]). High nightly call volume, versus no/low, was significantly associated with decreased mean TST ($\beta = -64.9$, $p = 0.0090$), WASO ($\beta = -5.1$, $p = 0.0090$), and SE ($\beta = -7.7$, $p = 0.0354$) after age and station adjustments, but not continuous SL. High nightly call volume, versus no/low, was significantly associated with TST ≤ 134 min (vs. > 134 min) (RR=3.42, $p < 0.0001$).

Conclusion: Firefighters working 24-hour shifts are expected to sleep on duty, yet high nightly call volume during 24-hour shifts increased risks for TST ≤ 134 min(vs. > 134) by over 3-fold, suggesting this shift-work exposure be recognized as a risk for short on-duty sleep. Advancing prospective research on objective sleep in on-duty firefighters may help inform sleep health promotion interventions in this population.

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0382

NEIGHBORHOOD CHARACTERISTICS AND SLEEP HEALTH AMONG CHILDREN: FINDINGS FROM THE NATIONAL HEALTH INTERVIEW SURVEY 2022, 2024Amanda Ng¹, Dzifa Adjaye-Gbewonyo¹, Lauren Hale²¹CDC National Center for Health Statistics, ²Stony Brook University Renaissance School of Medicine

Introduction: The importance of neighborhood characteristics for sleep health is well-documented among adults, but few nationally

representative studies have examined these associations among children.

Methods: Using data from the 2022 and 2024 National Health Interview Survey (NHIS), we examined associations between perceived features of neighborhoods (e.g., access to sidewalks, access to parks or playgrounds, unsafe traffic, and unsafe crime) and parent-reported sleep problems ((1) waking up not well-rested, (2) difficulty getting out of bed, (3) complaints of tiredness during the day, (4) napping or falling asleep during the day) among school-aged children ages 6-17 years (N=9,403). Each sleep measure was dichotomized to whether participants responded “most days or every day” vs. “some days or never.” A series of separate multivariable logistic regression models were estimated, with potential confounders (sociodemographic characteristics, geographic variables, health behaviors) added in sequential blocks. A sensitivity analysis redefining sleep measures using an alternate threshold of some days/most days/every day vs. never was also estimated.

Results: In fully adjusted models, unsafe traffic was associated with a 19% higher prevalence of reporting waking up not well-rested (adjusted prevalence ratio (APR): 1.19, 95% CI: 1.08-1.31), a 14% higher prevalence of reporting difficulty getting out of bed (APR: 1.14, 95% CI: 1.02-1.28), and 33% higher prevalence of complaining about being tired during the day (APR: 1.33, 95% CI: 1.14-1.55). Similarly, the presence of crime was associated with a 28% higher prevalence of reporting waking up not well-rested (APR: 1.28, 95% CI: 1.10-1.48), an 18% higher prevalence of reporting difficulty getting out of bed (APR: 1.18, 95% CI: 1.00-1.39), and a 39% higher prevalence of complaining about being tired (APR: 1.39, 95% CI: 1.13-1.72). Physical features of the neighborhoods (e.g., sidewalks and parks) were not related to sleep health following adjustment. Sensitivity analyses using the more broadly defined sleep measures attenuated most associations.

Conclusion: Traffic and safety features of the neighborhood are associated with children’s sleep health at the national level. Future work could examine these associations using longitudinal data or objective measures for both sleep and neighborhood features.

Support (if any):

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0383

DEPRESSION SYMPTOMS AS A PRE-SHIFT WORK RISK FACTOR FOR THE DEVELOPMENT OF SHIFT WORK DISORDER IN EMERGENCY PERSONNEL FOLLOWING 12-MONTHS OF WORK

Alexander Wolkow¹, Rachael Harris¹, Ben Meadley², Shantha Rajaratnam¹, Brett Williams³, Karen Smith⁴, Kelly-Ann Bowles², Megan Dobbie⁵, Sean Drummond⁶

¹School of Psychological Sciences, Monash University,

²Department of Paramedicine, Monash University, ³Faculty of Applied Medical Sciences, Jordan University of Science and Technology, ⁴Department of Public Health and Preventive Medicine, Monash University, ⁵Ambulance Victoria, ⁶Monash University

Introduction: Emergency service personnel, such as paramedics, predominantly perform rotational shift work to provide the public with around-the-clock care in times of crisis. Consequently, a high prevalence of emergency service personnel experience shift work disorder (SWD), a circadian rhythm sleep disorder associated with the shift work schedule that comprises symptoms of insomnia and/or excessive sleepiness. Despite the high rates of SWD in paramedics, the risk factors that predispose new personnel to SWD are not well understood. The present study examined whether mental health symptoms in new paramedics prior to shift and emergency work were associated with SWD later in their career.

Methods: Mental health symptoms and sleep disorder risk were examined in recruit paramedics (n=105) at baseline, prior to any shift and emergency work, and then again after 12-months of shift work as a paramedic. Prior to baseline, participants had no previous employment in any emergency service or defence force and had not worked shift work in the last 3 months. At both timepoints, participants completed validated measures to assess depression (Patient Health Questionnaire-9) and anxiety symptoms (Generalised Anxiety Disorder-7) and screen for risk of SWD (SWD Screening Questionnaire). Multivariate logistic regression models examined whether depression and anxiety symptoms at baseline were associated with SWD risk at the 12-month follow-up, after adjustment for confounders using the backward elimination method.

Results: Eighteen percent of paramedics were high risk of SWD after 12-months of shift and emergency work. Increased depression symptoms before beginning shift and emergency work were associated with higher odds of SWD at the 12-month timepoint (Adjusted Odds Ratio 1.25, 95% Confidence Interval 1.01-1.56, p = 0.04). Anxiety symptoms at baseline were not associated with SWD at the 12-month follow-up (Adjusted Odds Ratio 1.07, 95% Confidence Interval 0.88-1.28, p = 0.44).

Conclusion: Our findings establish depression symptoms before shift and emergency work as an early risk factor for the later development of SWD in new paramedics. These results suggest the need to investigate the effectiveness of interventions that target depression early in paramedics’ careers to reduce the future risk of SWD in this demanding occupation.

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0384

PERCEIVED LIFE CHAOS AS A KEY CONTRIBUTOR TO SLEEP DISTURBANCE IN FIREFIGHTERS

Matthew Lujan¹, Ashley Bohan¹, John Richmond Sy¹, Erin Rael¹, Madeleine McDonough¹, Dana Epstein², Matthew Buman², Daniel Taylor¹, Michael Grandner¹, Edward Bedrick¹, David Glickenstein¹, Patricia Haynes¹

¹University of Arizona, ²Arizona State University

Introduction: Firefighters balance demanding work schedules and complex household responsibilities, yet little is known about the interpersonal and organizational factors that shape their sleep health. Perceived life chaos, characterized by unpredictable

routines and difficulty planning daily activities, is a relatively new construct in sleep research and has not been examined in shift-working populations. This project aimed to disentangle the relative contributions of perceived life chaos, occupational factors, or household context to sleep disturbance among firefighters in 20 Arizona fire agencies.

Methods: Cross-sectional survey data were analyzed for 250 Arizona firefighters. Sleep disturbance was measured via the PROMIS Sleep Disturbance Short Form 8b. Perceived life chaos was assessed using a modified 4-item Chaos, Hubbub, and Order Scale. Occupational variables included rank, call volume, overtime hours, and years of night-shift exposure. Household variables included marital status, presence of a bed partner, household size, annual income, and secondary employment. Multivariable linear regression with backward selection was used to identify the most parsimonious set of predictors of sleep disturbance.

Results: Using backward selection, the final model predicting sleep disturbance retained four variables: perceived life chaos, occupational rank, marital status, and call volume. Higher perceived life chaos was significantly associated with greater disturbance ($\beta = 0.43$, $SE = 0.12$, $p < 0.001$). Fire managers reported less disturbance than non-managers ($\beta = -2.61$, $SE = 0.77$, $p = 0.001$). Compared with married firefighters, never-married firefighters reported lower disturbance ($\beta = -2.33$, $SE = 1.02$, $p = 0.02$). Higher call volume showed a trend toward increased disturbance ($\beta = 0.64$, $SE = 0.35$, $p = 0.07$) and was retained based on theoretical relevance. Other occupational and household variables, including overtime hours, years of night-shift exposure, and household composition, were excluded.

Conclusion: Perceived life chaos was the strongest predictor of sleep disturbance among firefighters, with additional contributions from occupational rank, call volume, and marital status. These findings highlight the value of examining interpersonal and organizational conditions that shape shift workers' day-to-day routines when considering future approaches to support sleep health in the fire service.

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0385

SLEEP AND HEALTH IN UNITED STATES AIR FORCE HELICOPTER AIRLIFT SQUADRON WORKING 24-HOUR ON-CALL SCHEDULES AS MEASURED BY A CONSUMER WEARABLE

Mark McHugh¹, Steven Hursh², Jaime Devine²

¹374th Operations Support Squadron (PACAF), ²Institutes for Behavior Resources, Inc.

Introduction: The 459th Airlift Squadron is a United States Air Force (USAF) helicopter airlift squadron stationed at Yokota Air Base outside Tokyo, Japan. The 459th operates on a 24-hour on-call shift to provide responsive airlift support for distinguished visitors, conduct aeromedical evacuations, search and rescue, and priority airlift missions throughout the Pacific. Several Pilots and Flight Engineers in the 459th received a consumer wearable

(Oura™ Ring, Generation 2 or 3) for their personal use. The goal of this pilot study is to explore the impact of 24-hour on-call schedules on service members' sleep and health over a 30-day period.

Methods: N=5 service members with a consumer wearable downloaded their personal data and sent the CSV file to the research team. Summary statistics (M±STD) were computed for average bedtime and wake time, time in bed (TIB) and total sleep time (TST) in minutes, sleep efficiency (SE), average resting heart rate (HR; bpm), heart rate variability (HRV; ms), temperature deviation (°C), and step counts across time. Potential changes in sleep and health variables over time were explored using simple linear regression.

Results: Each participant provided at least 30 days' worth of wearable data which coincided with active duty periods at Yokota Air Base between October 2024- 2025. Participants did not cross time zones during the study period. Average bedtime was 22:15±1:41 and average wake time was 6:34±1:20. Average TIB was 501±92 minutes, TST was 437±78 minutes, and SE was 88±7%. Average resting HR was 58±9 bpm and HRV was 69±37 ms. Average step count was 9648±4623. Temperature deviation was 0.00±0.26°C. Linear regression did not indicate a strong effect of time on changes to any variables (all R² < 0.2).

Conclusion: Sleep and health metrics measured by a consumer wearable fell within normal ranges for USAF Airlift Squadron service members working 24-hour on-call schedules. These preliminary data suggest that on-call schedules do not seriously disturb health metrics. These data only represent current wearable users and may not generalize to service members without access to a wearable. The next step in this study is to analyze participants' subjective fatigue and stress via a one-time online survey.

Support (if any): No external support

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0386

SCHOOL MATTERS: HOW SCHOOL SCHEDULES IMPACT ADOLESCENT SLEEP AND CARDIOMETABOLIC HEALTH

Cassandra Nyhuis¹, Susan Calhoun², Jason Liao³, Alexandros Vgontzas³, Edward Bixler³, Duanping Liao³, Julio Fernandez-Mendoza⁴

¹Johns Hopkins University, ²Penn State Health, ³Penn State College of Medicine, ⁴Penn State University, Hershey

Introduction: Adolescents experience shifts in circadian timing that conflict with early school start times, often leading to chronic sleep restriction and irregular patterns, which have been linked to adverse cardiometabolic outcomes. Multidimensional sleep health (MSH) frameworks offer a comprehensive approach to evaluating sleep. We previously developed a data-driven, multi-variable MSH framework, BEDReST, and in this study, we examined associations between MSH scores and metabolic syndrome (MetS), comparing BEDReST to RU-SATED and evaluating whether assessment context (in-school vs. on-break) modifies these associations.

Methods: Data from 341 adolescents (16.3 ± 2.2 yr; 47% female; 22.8% racial/ethnic minority) were analyzed. Two MSH scores were examined: RU-SATED and BEDReST (Breathing, Efficiency, Duration, Regularity, Satisfaction, and Timing), measured by polysomnography, actigraphy, and self-report. Both scores ranged from 0 to 6, with higher values indicating better sleep health. Linear regression models examined associations between MSH scores and a continuous metabolic syndrome (cMetS) score, where higher values indicate greater metabolic burden, stratified by assessment timing (in-school vs. on-break). Additional models assessed associations with key cardiometabolic markers, including blood pressure, fasting glucose and insulin, glucose-to-insulin ratio (GIR), and LDL cholesterol. All models were adjusted for age, sex, race/ethnicity, and socioeconomic status.

Results: MSH assessed while in-school showed stronger inverse associations with cMetS with BEDReST demonstrating larger effects ($B = -0.60$, $p < 0.05$) than RU-SATED ($B = -0.21$, $p > 0.05$). BEDReST was also associated with lower waist circumference ($B = -2.82$, $p < 0.05$), while RU-SATED was not ($B = -0.84$, $p > 0.05$). While on-break, both MSH scores were associated with improved insulin sensitivity, though BEDReST consistently showed stronger effects (BEDReST: HOMA-IR $B = -0.15$, $p < 0.05$; GIR $B = 2.71$, $p = 0.05$; RU-SATED: HOMA-IR $B = -0.11$, $p < 0.05$; GIR $B = 1.70$, $p = 0.07$), whereas associations with all other outcomes were weaker.

Conclusion: MSH assessed while in-school showed stronger associations with MetS and waist circumference than on-break, with BEDReST consistently demonstrating larger effects than RU-SATED. While on-break, both frameworks captured associations with insulin sensitivity, with BEDReST showing stronger effects. These findings highlight the importance of contextual factors and demonstrate the added value of a multivariable, data-driven approach to assessing MSH in adolescents.

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0387

PERCEIVED AND MEASURED INDOOR RESIDENTIAL TEMPERATURE WITH SLEEP OUTCOMES: PRELIMINARY FINDINGS FROM A COMMUNITY-BASED PILOT STUDY

Danielle Wallace, Jiyoung Hwang, Stefanie Ebel, Eri Saikawa
Emory University

Introduction: Temperature is an important environmental component for sleep health, with both cold and hot temperatures linked to adverse sleep outcomes. More extreme temperatures, including hotter nights, are expected to become more frequent with climate change. Here, we investigated whether sensor-measured indoor household temperature and self-reported perceptions were associated with measures of sleep health.

Methods: We completed a community-based pilot study ("Tracking TEMP") of Atlanta-area adult residents in the summer of 2025 (May-August). During the study, participants were provided with wrist-worn actigraphy devices (ActLumus, Condor Inst.) and stationary indoor temperature monitors (HOBO devices) and asked to complete a daily sleep diary over a 2-day measurement period. Participants also completed surveys that collected demographic,

sleep, and residential information, including their perception of household temperature for that summer (too cool, too warm, or "just right"). Analyses evaluated whether daily pre-sleep average indoor temperatures or self-reported perception of household temperature were associated with sleep efficiency, wake after sleep onset (WASO), onset latency, sleep onset time, or sleep duration in mixed models. Secondary analyses evaluated whether daily light exposure was associated with household temperature perception.

Results: Among the 46 participants with multi-day sleep and actigraphy measures and survey data, indoor pre-sleep temperatures ranged from 17.5 to 30.1°C. Higher objectively-measured indoor pre-sleep temperature was associated with worse sleep efficiency ($\beta = -0.8$, $p < 0.05$) and hotter perceived household temperature was associated with longer WASO duration ($\beta = 20.4$ minutes, $p < 0.05$) and fragmentation amount, but not other sleep measures. Perception of household temperature as either too cool or too warm (compared to "just right") was also associated with lower average daily light exposure ($\beta = -0.2 \log_{10}\text{-lux}$, $p < 0.05$).

Conclusion: In this preliminary analysis of real-world data, actual and perceived household temperatures were associated with different sleep health outcomes. Likewise, temperature perception may be associated with light exposure, either through light's effects on temperature regulation or as a marker of time in outdoor environments and temperature habituation. Work is ongoing to evaluate the influences of other environmental and demographic factors as well as daytime heat exposure on sleep health.

Support (if any): Pilot award from the Emory Climate & Health Actionable Research and Translation Center (CHART) [NIEHS P20ES036110]

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0388

MULTIDIMENSIONAL SLEEP HEALTH OF COLLEGE STUDENTS FROM RURAL AREAS: A MIX-METHOD STUDY

Linying Ji

Montana State University

Introduction: Suboptimal sleep is prevalent among college students, with 45.5% of college students not getting enough sleep. However, these data overlook differences in sleep health among college students with different demographic backgrounds. College students from rural areas face additional challenges impacting their sleep. Yet no prior research has investigated the sleep health of rural students transitioning to non-rural colleges. This project investigated multidimensional sleep health of college freshmen from rural versus urban areas and identified key risk and protective factors of healthy sleep.

Methods: This is a mixed-method study: quantitative data collection over one month, and qualitative interviews after the data collection period. Participants were 75 college freshmen recruited from a University in the Midwest, US. Among them, 51 were from rural areas, defined using the National Center for Education Statistics locale classifications. Participants were instructed to wear GENEActive for one month, and objective sleep parameters,

including total sleep time, wake after sleep onset, and sleep efficiency, were estimated. Participant also reported their subjective multidimensional sleep health with the Ru-SATED 4.0 scale for both prior to college and during the first semester of college. Participants' demographic information was collected at the beginning of the study.

Results: Quantitative results indicated no significant differences among rural and urban students based on self-reports of sleep before college, except that rural students had better sleep quality. However, during the first semester, rural students had slightly shorter sleep duration and wider variability in sleep duration, later and more variability in sleep timing, less awake during daytime, and had more variability in their sleep satisfaction. Qualitative interviews identified unique factors affecting rural students' sleep. In addition to common risk factors for all college students, including academic stress, roommates, and social life, rural students were more affected by environmental noise and social anxiety.

Conclusion: This study addresses the research gap in the sleep health of rural students transitioning to non-rural colleges. Findings of this research highlight the importance of accounting for demographic background in studying the sleep health of college students. Understanding the unique experiences of rural students will inform the development of future intervention programs.

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0389

NIGHTTIME SMARTPHONE USE IS ASSOCIATED WITH WORSE SLEEP AMONG FIREFIGHTERS: A PILOT STUDY

David Reichenberger¹, LaTroy Robinson¹, Ayeisha Haswarey¹, Heshy Nemer², Linying Ji², Steven Shea¹, Nicole Bowles³

¹Oregon Health & Science University, ²Montana State University,

³Oregon Institute of Occupational Health Sciences

Introduction: Firefighters provide around-the-clock emergency responses under demanding schedules. Firefighters may engage with personal devices after responding to nighttime emergency calls to maintain alertness or to decompress, including scrolling social media, watching videos, or playing video games. We hypothesized that greater smartphone use, especially overnight, would be associated with worse sleep that night.

Methods: Across two weeks, 17 firefighters (24% women; 71% 18-34 years old) from Missouri (N=11) and Utah (N=6) completed daily surveys, wore a wGT3X-BT actigraph for sleep/wake demarcation, and provided daily screenshots of the Screen Time (iOS 16.1-18.5; N=10) or StayFree (Android 12-15; N=7) application on their smartphone. Hourly smartphone use was extracted from Screen Time screenshots using a custom Python script with optical character recognition and from StayFree screenshots via manual data entry. Hourly smartphone use was summed across the 24h calendar day, experienced day (actigraphic waketime-to-waketime), evening (18:00-00:00), and overnight (00:00-06:00). Separate multilevel models with random intercepts for firefighters and person-mean-centered smartphone use predictors were estimated for each actigraphic sleep outcome (sleep timing, duration,

and efficiency; mean=10.1 nights/firefighter). All models were adjusted for age, state of employment, type of smartphone, on-/off-duty, and daily naps.

Results: On average, firefighters used their smartphone for 4.7±2.0h per calendar day, 4.2±2.1h per experienced day, 1.6±0.6h per evening, and 0.4±0.7h (00:00-06:00) after midnight. Within-person results showed that each additional hour of evening smartphone use more than usual was associated with 15.9±5.8 minutes earlier sleep onset (p=0.007) and 16.8±6.5 minutes longer sleep duration (p=0.010) that night. Conversely, sleep onset was 31.7±7.8 minutes later (p< 0.001), sleep duration was 30.0±8.7 minutes shorter (p< 0.001), and sleep efficiency was 2.1±1.0% lower (p=0.033) for each additional hour of smartphone use than usual after midnight. Daily smartphone use was not associated with worse sleep that night.

Conclusion: Overnight smartphone use was associated with worse sleep that night among firefighters in this pilot study, even after adjusting for on-duty nights, whereas evening smartphone use predicted earlier and longer sleep. Overnight use of personal devices may exacerbate the sleep disruption firefighters routinely experience when responding to emergencies, further compromising firefighters' sleep and overall health.

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0390

ASSOCIATIONS OF MENTAL HEALTH AND PAIN WITH ACTIGRAPHICALLY-ASSESSED SLEEP: A PROSPECTIVE STUDY OF OPERATIONAL FIREFIGHTERS

Christen Dunn, Amanda Banaag, Mariana Szklo-Coxe
Old Dominion University

Introduction: Prior firefighter studies have rarely assessed actigraphic sleep beyond 14 days or evaluated mental health's relationship to objective sleep, the aims of this prospective study.

Methods: Thirty-two participating firefighters were assessed via actigraphy (Philips Spectrum Plus) for 21 days and follow-up questionnaires including: Generalized Anxiety-7 questionnaire-assessed anxiety(categorized as mild[5-9], moderate[10-14], severe[≥15]), Patient Health Questionnaire-9-assessed depression(categorized as mild[5-9], moderate[10-14], severe[≥15]), PTSD-5-assessed PTSD(≥4-presence versus 0-3-none), pain(presence versus absence), and work exposures for their 21-day cycle. Actigraphic measures were assessed continuously and categorically-sleep latency(SL)< 8min, total sleep time(TST)≤180.5min(≤75thpercentile), wake after sleep onset(WASO>31.5min[>75thpercentile]), and sleep efficiency(SE)≤80%. Unadjusted and adjusted generalized estimating equations linear regression models and robust Poisson regressions estimated associations of mental health and pain with mean and categorized sleep, respectively, summarized for 657 person-days adjusting for age, poor sleep quality, comorbidity, sleep apnea, chronotype, occupational measures.

Results: Mean actigraphic sleep measures over 657 person-days were: 11min(SD=29.9), 284min(SD=128.4) TST, 19.5(SD=18.7)

WASO, 84.7%(SD=13.2) SE. After adjustments, severe anxiety (versus mild) was significantly associated with increased shorter mean SL($\beta=-11.6, p=0.0245$); moderate and severe depression (versus mild), with longer mean SL($\beta=24.0, p=0.0245$ and $\beta=32.4, p=0.0011$, respectively) and TST($\beta=77.6, p<0.0001$ and $\beta=66.0, p=0.0144$, respectively); pain(versus absence), with shorter mean SL($\beta=-15.5, p<0.0001$) and TST($\beta=-37.3, p=0.0080$). In adjusted Poisson models, moderate (versus mild) depression lowered SL<8min risk(versus ≥ 8)(RR=0.61, $p=0.02$); moderate (RR=1.71, $p<0.0001$) and severe (RR=1.89, $p=0.0002$) anxiety(versus mild) significantly increased TST ≤ 180.5 min risks(versus>180.5), while moderate (RR=0.68, $p=0.0027$) and severe (RR=0.50, $p=0.0225$) depression(versus mild) significantly lowered short TST ≤ 180.5 min risks (versus>180.5); severe(versus mild) anxiety (RR=0.41, $p=0.0354$) significantly lowered SE $\leq 80\%$ risks(versus >80%); moderate (RR=8.36, $p=0.0005$) and severe (RR=24.89, $p=0.0005$) depression(versus mild) elevated SE $\leq 80\%$ risks(versus>80%).

Conclusion: After adjustments, pain increased poorer sleep health risks (exempting SE). Moderate and severe depression and PTSD decreased shorter TST risks. In contrast, moderate and severe anxiety increased shorter TST risks, suggesting mental health conditions may pose differential risks for poor sleep in operational firefighters.

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0391

BEDTIME TECHNOLOGY USE IS ASSOCIATED WITH SLEEPINESS, POOR SLEEP QUALITY, AND POOR MENTAL HEALTH (BURNOUT, STRESS, AND COPING) IN FIREFIGHTERS

David Mastin¹, Khloe Salpid¹, Xavier Parker¹, Perez-Benitez Andrea¹, Abigail Hartsfield¹, Natalie Mattson¹, Richard King², Madison Sanders³, Ashley Mathis⁴, Bruce Moore¹, Jennifer Peszka⁵

¹University of Arkansas Little Rock, ²Henderson State University,

³Arkansas Children's Research Institute, ⁴New Mexico State University, ⁵Hendrix College

Introduction: Sleep disorders and poor sleep quality are prevalent in firefighters (30.49% and 51.43% respectively). Factors associated with poor sleep among firefighters include shiftwork, depression, stress, psychosomatic disorders, and post-traumatic stress. Poor sleep quality, sleep disorders, and insufficient sleep negatively impact physical and mental performance and productivity. Traditional sleep hygiene behaviors (e.g. consistent bed and wake times, comfortable sleeping conditions, reducing caffeine and exercise before bed) are related to better sleep, but can be challenging for firefighters to change due to dynamic schedules and the nature of their jobs. We assessed the relationship between sleep hygiene, sleepiness, sleep quality, and mental health in

firefighters focusing on the specific modifiable sleep hygiene behavior of bedtime technology use.

Methods: 95 firefighters (M = 44.8 years, SD = 11.7; 12 females, 83 males) completed a 20-minute questionnaire packet at a statewide firefighter conference: Pittsburg Sleep Quality Index, Epworth Sleepiness Scale, Sleep Hygiene Index-Technology, Oldenburg Burnout Inventory (Disengagement and Exhaustion), Perceived Stress Scale, and firefighter coping questions.

Results: Sleep hygiene, sleep and mental health: Poor sleep hygiene was significantly related to greater sleepiness ($r(80)=.511, p<.001$), poorer sleep quality ($r(73)=.539, p<.001$), more stress ($r(82)=.480, p<.001$), greater exhaustion ($r(86)=.317, p=.001$), and poorer firefighter coping ($r(84)=.239, p=.013$). Bedtime technology use, sleep and mental health: Active, but not passive, bedtime technology use by firefighters was significantly related to greater sleepiness ($r(88)=.310, p=.001$), and poorer sleep quality ($r(80)=.353, p<.001$). Firefighter active technology use also predicted stress ($r(91)=.345, p<.001$) and exhaustion ($r(94)=.171, p=.048$). Additionally, active, but not passive, bedtime technology use by the firefighters' bed partners was significantly related to greater sleepiness ($r(85)=.245, p=.011$), and poorer sleep quality ($r(77)=.349, p<.001$). Bedpartner active technology use also predicted stress ($r(88)=.241, p=.011$) and exhaustion ($r(91)=.215, p=.019$).

Conclusion: Maladaptive sleep hygiene, in particular active bedtime technology use (either by firefighters or their bed partners), was related to sleepiness, poor sleep quality, and poor mental health. Although causation is not clear, it suggests education and incentives to reduce bedtime technology use could improve sleep and mental health in firefighters who would likely have difficulty altering more traditional sleep hygiene variables.

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0392

EXPLORING CREW RECUPERATION AFTER DEPLOYMENT: PRELIMINARY RESULTS

Nita Shattuck, Paul Lester, Panagiotis Matsangas

Naval Postgraduate School

Introduction: Crewmembers on United States Navy ships often spend months deployed away from their homeports. During these deployments, their lives are characterized by long hours of shift work, sleep deprivation, circadian misalignment, with few days off and periods of high stress. Little is known about how Sailors recuperate upon returning to homeport.

Methods: In a naturalistic longitudinal approach using Gen3 ÖURA rings, we monitored the sleep of 67 Sailors (20 to 59 years of age; 71.6% males; 73.1% enlisted personnel) from three destroyers during and after an ~8-month deployment. Sailor sleep during the entire deployment was assessed by descriptive analysis. Mixed-effects models were used to estimate differences in sleep characteristics across two months (one before and one after returning to homeport).

Results: Over the entire deployment, Sailors slept on average 6.44 ± 0.78 hours/day (80% slept < 7hrs/day). Approximately 91% of the Sailors spent < 25% of their major sleep

episode in deep sleep; ~41% spent < 20% in REM sleep. The month post-return was characterized by increased average respiratory rate (difference=0.1breaths/minute, $p=0.021$), average heart rate (difference=1.7bpm, $p=0.011$), lowest heart rate (difference=1.1bpm, $p=0.045$), but no statistically significant differences in daily sleep duration ($p=0.241$), sleep architecture (light sleep, $p=0.506$; deep sleep, $p=0.188$; REM sleep, $p=0.154$), heart rate variability ($p=0.096$), sleep latency ($p=0.339$), and sleep efficiency ($p=0.166$).

Conclusion: We did not identify systematic and substantive differences in sleep immediately following deployment compared to the period preceding the end of the deployment. Although we cannot establish the causal factors leading to this pattern of results, the issue of recuperation from chronic sleep deprivation after returning to homeport is important in terms of Sailor operational performance, well-being, and health. Thus, the Navy should educate Sailors on the importance of both deployment and homeport sleep hygiene. We recommend that a) Sailor recuperation be studied further and that b) the Navy should develop evidence-based recuperation guidelines.

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0393

FREE THROWS AREN'T FREE: THE COST OF DAYLIGHT-SAVING TRANSITION IN THE NBA

Cassandra Mullen¹, Lihao Liu², Zuoheng Wang², Karin Johnson³, Klar Yaggi⁴

¹The Oregon Clinic, ²Yale New Haven Hospital, ³UMass Chan Medical School - Baystate, ⁴Yale

Introduction: Daylight Saving Time (DST) affects more than 1.5 people globally and produces both circadian misalignment and acute sleep loss, particularly during the spring transition. Both mechanisms can impair athletic performance, particularly skill-based tasks like shooting free throws in basketball. Prior work has documented adverse health and safety outcomes surrounding DST shifts and has been shown to be associated with performance decrements in endurance running events. Whether DST transitions impact skill based athletic performance remains unclear. This study evaluated the impact of spring and fall DLS transitions on National Basketball Association (NBA) free-throw percentage (FTP).

Methods: Using a natural-experiment design, we analyzed regular-season NBA games across 29 seasons. Individual athlete's free-throw makes and attempts were extracted from ESPN play-by-play data and matched to DST calendar dates. Arizona games on DST days were excluded. For each season, DST-day FTP was compared with two same-season baselines: (1) the week prior and (2) the entire non-DST season. Analyses were performed at league, team, and individual levels. Players were grouped into tertiles by baseline FTP, and quality-filtered analyses required ≥ 3 attempts

in both windows. Paired samples t-tests evaluated mean FTP differences (Δ FTP). Bonferroni correction-controlled multiplicity for six primary week-prior comparisons. Exploratory analyses evaluated post-DST Days +1 to +3 and correlations between Δ FTP and prior-day time-zone travel.

Results: Across 34,316 player-game observations (>1.5 million free-throw attempts), no significant DST effect was detected at the league or team level for either transition. The only decrement surviving multiplicity correction occurred in the spring among players in the highest baseline-FTP tertile: league-level Δ FTP = -0.025 ($p = 0.0039$) and individual-level Δ FTP = -0.031 ($p = 0.0009$; ≥ 3 -attempt filter). No other spring or fall tertile reached significance after correction. Exploratory post-DST and time-zone-travel analyses produced small, inconsistent estimates with no reproducible patterns.

Conclusion: A modest decline in FTP after the transition to spring DLS was observed only among the highest-accuracy shooters. Whereas DLS transitions do not meaningfully impact free throw percentage at the league or team level, nor in those starting from a worse baseline FTP. Overall, the findings indicate minimal performance impact of DST on professional basketball free-throw shooting.

Support (if any):

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0394

REGIONAL DIFFERENCES IN SELF-REPORTED SLEEP HEALTH DURING THE COVID-19 LOCKDOWN

Vanshikha Vij, Kathryn Kennedy, Michael Grandner, William Killgore
University of Arizona

Introduction: Insomnia symptoms increased globally during the COVID-19 pandemic, though regional patterns within the United States remain unclear. We hypothesized that adults in the U.S. South would have greater insomnia severity (Insomnia Severity Index; ISI) and poorer sleep quality (Pittsburgh Sleep Quality Index; PSQI), than adults in other U.S. regions during the pandemic, given the region's higher rate of cardiovascular conditions, which are known to affect sleep.

Methods: U.S. adults were surveyed from April 2020 to October 2021 (approximately 1000 per month; 42% female; ages 18-92). Sleep quality and insomnia were assessed using the PSQI and ISI. Responses from Alaska, Hawaii, and U.S. territories were excluded to focus on continental regional trends. Chi-square tests compared lockdown frequency by region. Mixed-effects models, controlling for demographics and including random intercepts for state, examined associations between region, lockdown status, and sleep outcomes. Right-skewed ISI scores were analyzed using a Tweedie generalized linear mixed-effects model.

Results: Lockdown prevalence differed significantly across U.S. regions ($\chi^2(3, N = 13,149) = 386.68, p < .0001$, Cramér's $V = .17$), with the West exhibiting the highest frequency. All participants were found to have a higher PSQI scores on average ($b = 0.32, p < .001$) and ISI score (~13% increase, $b = 0.12, p < .001$) during lockdowns compared to non-lockdown periods, but these effects

did not differ significantly by region. Females reported greater insomnia symptoms than males ($b = 0.15$, $p < .001$). In separate models where exercise was evaluated as a potential predictor, this was not significantly associated with PSQI or ISI outcomes. Between-state variance was minimal in all models.

Conclusion: Lockdown status was associated with poorer sleep quality and greater insomnia severity across the United States, regardless of region. Although regional differences in lockdown prevalence were observed, these did not translate into regional differences in PSQI or ISI outcomes. Female sex was linked to increased sleep disturbances, while exercise was not a significant predictor. These findings highlight the widespread impact of pandemic-related disruptions on sleep. Future research should investigate behavioral and environmental factors that may contribute to variations in insomnia severity in the U.S.

Support (if any):

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0395

SHIFT WORK AND SLEEP HEALTH: FINDINGS FROM A SLEEP STUDY IN THE NURSES' HEALTH STUDY 3

Sina Kianersi¹, Kaitlin S. Potts¹, Caitlin Delaney¹, Heming Wang², Jorge Chavarro¹, Jaime Hart¹, Susan Redline², Tianyi Huang³

¹Brigham and Women's Hospital and Harvard Medical School,

²Brigham and Women's Hospital, ³National Institute of Aging

Introduction: Shift work, common in essential occupations such as nursing, can contribute to poor sleep health and circadian disruption. Comprehensive evidence linking shift-work type to subjective and objective multidimensional sleep health remains limited.

Methods: In a recent sleep study (2023–2025) within the Nurses' Health Study 3, we analyzed 946 (98% female) participants who reported their current shift work status in the past four weeks. Fitbit-measured within-person mean total sleep duration and its standard deviation (SD; reflecting irregular sleep duration), in hours, were calculated over a median of 15.5 days per participant (range: 7–82). Participants also completed a sleep questionnaire, including self-reported workday/non-workday sleep duration, insomnia symptoms (Women's Health Initiative Insomnia Rating Scale, WHIIRS), chronotype (Morningness–Eveningness Questionnaire, rMEQ), and sleep medication use. We used linear and modified Poisson regression to evaluate the cross-sectional associations between current shift work status and sleep health outcomes, adjusted for age, sex, race, and full-time employment status.

Results: Overall, 32% of participants reported working some type of non-day shift: 11% mixed, 8% early morning, 6% evening, 5% night, and 3% on-call shifts. Shift workers had slightly lower mean rMEQ scores than non-shift workers ($p < 0.0001$), indicating greater eveningness. Fitbit-measured mean sleep duration was shorter comparing all shift-working groups with non-shift workers, with significant differences for on-call (β : -0.53, 95% CI: -0.97, -0.09) and mixed shift workers (β : -0.32, 95% CI: -0.55, -0.09). Self-reported sleep duration was shorter for shift workers compared

with non-shift workers, particularly night-shift workers on work-days (β : -0.99, 95% CI: -1.29, -0.69). Sleep duration irregularity was higher for all shift-working groups compared with non-shift workers, with night-shift workers showing the greatest difference (β : 1.02; 95% CI: 0.83, 1.21). Compared with non-shift workers, sleep medication use was higher among night shift workers (prevalence ratio[PR]: 1.59, 95% CI: 1.21, 2.08), while worse insomnia symptoms (WHIIRS>10) were more prevalent among early morning shift workers (PR: 1.20, 95% CI: 0.94, 1.52).

Conclusion: Among middle-aged nurses, shift work was adversely associated with several aspects of sleep health. Different shift types were associated with distinct sleep health dimensions, suggesting that health outcomes may also vary by shift type.

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0396

SLEEP BEHAVIOR AT BASE AND LAYOVER IN AUSTRALIAN REGULAR PUBLIC TRANSPORT AND CHARTER FLIGHTS USING CONSUMER SLEEP TECHNOLOGIES (CSTS)

Jaime Devine¹, Kayler Marshall², Melissa Clarke², Steven Hursh¹, Jane Thomson²

¹Institutes for Behavior Resources, Inc., ²Alliance Airlines Flight Operations

Introduction: Fatigue risk management is an important part of maintaining safety in aviation. Alliance Airlines provides contracted aviation services and short-term charter services in the Australasian region. The airline recently began a trial of a sleep hygiene mobile application that uses data from consumer sleep technologies (CSTs) to provide predictions of alertness to the user and remotely extract data from devices. This trial is on-going. The object of this analysis is to compare crew member sleep during layover nights to sleep at homebase.

Methods: Flight crew participants wore either a Fitbit, Garmin, or Oura brand CST and provided data through the SleepTank mobile app using study-provided emails. Sleep data was extracted via the mobile app; work schedules were provided by the airline's flight operations team. Summary statistics ($M \pm \text{STD}$) were computed for average bedtime and waketime, time in bed (TIB) and total sleep time (TST) in minutes, and sleep efficiency (SE). Schedule data were used to assign sleep events to base or layover conditions. Two-sample t tests with unequal variances compared sleep variables between base and layover conditions. Effect size was estimated using Hedges' g .

Results: To date, $N=12$ pilots based in Queensland provided 2+ weeks' worth of wearable data which coincided with work periods during the 2025 calendar year. Each participant provided an average of 33 days of base sleep data and 5 days of layover sleep data. Sleep events were earlier and shorter during layover compared to base: (Bedtime: 21:27 $\pm$ 2:02hr vs. 22:28 $\pm$ 2:19hr, $t=2.24$, $g=0.83$, $p<0.001$; Waketime: 5:39 $\pm$ 2:12hr vs. 6:57 $\pm$ 2:19hr, $t=4.38$, $g=0.56$, $p<0.001$; TIB: 428 $\pm$ 78min vs. 495 $\pm$ 124min, $t=5.61$, $g=0.57$, $p<0.001$; TST: 373 $\pm$ 67min vs. 430 $\pm$ 104min, $t=5.48$, $g=0.57$, $p<0.001$). SE did not differ (92 $\pm$ 4% vs. 91 $\pm$ 6%; $t=0.45$, $g=0.07$, $p=0.33$). Differences in sleep timing could not be explained by time zone changes.

Conclusion: Charter pilots flying daytime regional operations exhibited shorter/earlier sleep behavior during layover compared to base. Sleep behavior may have been affected by time limitations during layovers. This on-going study will collect data from cabin and ground crew and crew from other bases. Future analyses will examine the impact of feedback about alertness on crew member sleep behavior.

Support (if any): No external funding.

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0397

SLEEP DISTURBANCES AMONG ADULTS WITH CEREBRAL PALSY AND ASSOCIATIONS WITH PAIN, FUNCTION AND QUALITY OF LIFE

Caleb Kim¹, Jeeyeon Kim², John Pokowski², Edward Hurvitz², Daniel Whibley³

¹University of Washington School of Medicine, ²University of Michigan Department of Physical Medicine and Rehabilitation, ³University of Michigan

Introduction: Sleep disturbances are common among individuals with cerebral palsy (CP) across the lifespan, but specific extent and impact among adults with CP are underexplored. In other clinical populations, poor sleep is consistently linked to increased pain, reduced physical function, and diminished quality of life (QoL). Developing a better understanding of sleep disturbances in adults with CP and associations with symptom profiles could inform strategies to improve overall health and wellbeing in this group.

Methods: We conducted a cross-sectional analysis using data from the North American Cerebral Palsy Research Network (CPRN) community registry of adults aged ≥ 18 years. The registry collects demographic and clinical data and includes validated self-report instruments: PROMIS measures (sleep disturbance, pain, anxiety, depression, social role satisfaction) and Neuro-QoL measures (extremity function, perceived stigma). T-score standardization (mean 50, SD 10) of these measures enables comparison to a normative population. Descriptive statistics characterized the sample and Pearson correlations quantified associations between sleep disturbance and other variables.

Results: Among 541 participants (71.5% female, mean age 45.8 ± 14.0 years), according to the Gross Motor Function Classification System, 64.5% were ambulatory (levels I–II), 13.1% used a hand-held device to ambulate (level III) and 16.3% had limited/dependent mobility (levels IV–V). Mean PROMIS sleep disturbance was 53.3 ± 8.1 . Greater sleep disturbance was significantly correlated with higher pain intensity ($r=0.40$), pain interference ($r=0.39$), anxiety ($r=0.39$), depression ($r=0.32$), perceived stigma ($r=0.26$), more impaired lower extremity function ($r=-0.15$), and lower satisfaction with social roles ($r=-0.32$; all $p < 0.05$). Upper extremity function was not correlated ($r=-0.07$). Correlations remained robust after adjusting for age.

Conclusion: Among a large community registry of adults with CP, sleep disturbances were elevated and associated with pain, lower extremity function and indicators of poorer QoL. Longitudinal studies are needed to assess causality and, if demonstrated, would support a case for routine integration of sleep evaluation into clinical care of adults with CP with potential to improve symptom burden and overall health.

Support (if any): Cerebral Palsy Research Network

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0398

SLEEP HABITS AND PERSISTENCE IN STEM CAREER PATHWAYS

Michael Scullin, Corinne Fitzsimmons, Jason Carter
Baylor University

Introduction: Poor sleep health is common in university students, but the longitudinal impact of sleep habits on academic outcomes remains unclear. We investigated sleep quality, timing, and duration in first year university students enrolled in science, technology, engineering, or mathematics (STEM) tracks in relation to future educational and career-oriented outcomes.

Methods: First year STEM majors, including Pre-Health track students ($N=489$, Mage=18.27 years, 72.2% females, 53.8% BIPOC), completed the Pittsburgh Sleep Quality Index, Morningness-Eveningness Questionnaire, Epworth Sleepiness Score, weekday and weekend sleep duration reports, and measures of mental health and fluid intelligence. Cumulative grade-point-average (GPA) and STEM pathway change were collected at the end of Year 2. Analyses were adjusted for age, sex, race/ethnicity, depressive symptoms, trait anxiety, and fluid intelligence.

Results: Compared to students who left STEM, those who persisted slept 28 minutes/night more at baseline ($t(482)=2.73$, $p=.007$, $d=.41$). Covariate-adjusted analyses indicated that there was a 4.9% reduction in the odds of leaving STEM tracks by the end of Year 2 for every additional 10 minutes of average weekday sleep duration (at baseline). Mediation analysis showed that first year GPA only partially mediated the effect of weekday sleep duration on STEM retention; interestingly, there was still a direct 4.4% decreased odds of leaving STEM for each additional 10 minutes of weekday sleep duration, as well as an indirect association of a 1.2% decreased odds of leaving STEM through first year GPA. Sleep measures were also predictive of overall academic performance: in adjusted analyses, higher global sleep quality at baseline predicted a higher second year GPA ($\beta=-.046$).

Conclusion: Sleep quality and duration in first year students are important predictors of longitudinal academic outcomes, even when accounting for traditional hallmark predictors (demographics, mental health, intelligence). Future research should examine post-graduate career decisions and investigate causal directions, but the current data highlight the likely need for individual- and environmental-level interventions for sleep health in first year students.

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0399

SLEEP TIMING IN RELATION TO CIRCADIAN PHASE AND TURNOVER IN EARLY-MORNING SHIFT WORKERS

Kathryn McAuliffe, Andrew McHill, Brooke Shafer
Oregon Health & Science University

Introduction: Shiftwork is associated with numerable adverse health outcomes including cardiovascular disease, obesity, and depression. Additionally, turnover intention is higher in those

working shiftwork, however these feelings are not ubiquitous. Reasons why some individuals contemplate leaving their role during shiftwork, while others do not, have yet to be established. One mechanism may be the degree of circadian alignment an individual experiences during shiftwork. Thus, we investigated the relationship between turnover intention and the timing of sleep in relation to circadian phase (i.e., phase angle of entrainment) in new bus operators during their transition to early-morning shiftwork.

Methods: Twenty-eight volunteers (9 female; aged [average $\pm$ SD] 35.4 $\pm$ 7.1yr) underwent an ~8h evening in-laboratory stay in dim-lighting (< 5 lux) and completed a 1-week sleep diary during a day-oriented onboarding. Following onboarding, operators either transitioned to a shiftwork schedule ($n=21$; >33% of shifts starting before 7am) or maintained a daywork schedule ($n=7$; < 33%) and completed weekly diaries over 17 weeks to capture turnover intention. Circadian phase was determined via salivary dim-light melatonin onset (DLMO; 3pg/ml) and phase angle was calculated by average onboarding sleep onset minus DLMO. Turnover intention was measured via survey with the question “I am seriously thinking about quitting my job” with Likert-scale responses of 1-Strongly Disagree to 5-Strongly Agree, with the highest score calculated for each participant. Associations between phase angle and turnover intention were calculated by group via Pearson Correlation.

Results: There was a significant negative correlation between phase angle and turnover intention within the shiftwork group ($r=-0.46$, $p=0.04$), such that narrower phase angle correlated with higher intention to leave; there was no significant association within the daywork group ($r=0.63$, $p=0.13$).

Conclusion: During the transition to an early-morning shiftwork schedule, a narrower phase angle was associated with higher turnover intention in those working shiftwork but not daywork. These findings could explicate a mechanism by which some individuals consider changing roles during shiftwork. Further research into circadian alignment and turnover intention, particularly in overnight shift workers, could elucidate possible intervention targets to promote wellbeing and reduce turnover intention in shift working employees.

Support (if any): OHSU School of Nursing PhD Student Scholarship Award

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0400

THE EFFECT OF THE 2020 US PRESIDENTIAL ELECTION ON SLEEP AND EMOTIONAL AFFECT BY ELECTION OUTCOME

Junwoo Park, Seo Ho Song

Beth Israel Deaconess Medical Center

Introduction: Major political events can serve as naturalistic stress tests, disrupting sleep and heightening emotional affect. The 2020 United States presidential election was rather unusual as the outcome was not projected for several days, prolonging uncertainty beyond election night. Emotional responses to such events are likely to depend on whether the apparent or eventual outcome aligns with individuals' political preferences and on the strength of their ideological commitment. Sleep is a modifiable behavior that may further shape these trajectories. The study examines how election-night sleep, political ideology, and outcome congruence jointly relate to changes in emotional affect.

Methods: A non-representative, primarily liberal-leaning (69.6%) convenience sample of US ($n=437$) and non-US-residing ($n=106$) participants was recruited. Participants completed daily online surveys assessing sleep duration and quality, affect, alcohol use, and related health measures during a baseline period (October 1–13, 2020) and the days surrounding the 2020 election (October 30–November 12, 2020). Linear mixed-effects models will estimate within-person changes in emotional affect across the election window as a function of election-night total sleep time and sleep efficiency, ideology strength, and outcome congruence.

Results: Planned analyses are anticipated to show higher negative affect during the election window than on baseline mornings. Misaligned outcomes (preferred candidate not winning) and stronger ideological positions are expected to be associated with larger and more persistent elevations in negative affect. Longer and more efficient election-night sleep is expected to attenuate these elevations and to be associated with steeper declines in negative affect over subsequent days, particularly among participants with misaligned outcomes and strong ideological commitment.

Conclusion: These anticipated patterns would suggest that misalignment between political preferences and election outcomes, especially among strongly ideological individuals, is associated with heightened and prolonged negative affect and that better sleep may partially buffer these responses. Interpretation will need to consider that ideological self-report does not fully capture satisfaction with specific candidates and that the delayed projection of the 2020 outcome means much of the election window reflects prolonged uncertainty rather than a single post-result day.

Support (if any):

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0401

RELATIONSHIP BETWEEN SUBJECTIVE SLEEP DURATION AND QUALITY WITH EXERCISE DURING THE PERINATAL PERIOD

Erin Kishman, Jake Anderson, Michele Okun

University of Colorado, Colorado Springs

Introduction: Women commonly experience sleep disruption during the perinatal period, which has been associated with adverse outcomes for the mother and infant. Exercise has been associated with improved sleep quality in the general population. However, the impact of exercise on sleep in the perinatal period remains unclear. The purpose of this analysis was to examine the relationship between subjective sleep duration and quality with self-reported exercise during the perinatal period.

Methods: Forty-four pregnant women (31 $\pm$ 5 years) were enrolled in a longitudinal observational study. Visits took place at 16–20 weeks gestation, 28–31 weeks gestation, and 3 months postpartum. At each timepoint participants completed the Pittsburgh Sleep Quality Index (PSQI) and reported weekly exercise frequency. To examine if there were any differences between those who exercised and those who didn't at each timepoint, independent t-tests were performed. One-way ANOVAs were performed to examine the association of exercise frequency with sleep duration and PSQI global scores at each timepoint ($\alpha=0.05$). Data are presented as mean $\pm$ SD.

Results: Participants self-reported sleeping 7.4 $\pm$ 1.4, 7.2 $\pm$ 1.2, and 6.6 $\pm$ 1.1 hours per night at each timepoint. PSQI scores were 7 $\pm$ 4, 7 $\pm$ 4, and 6 $\pm$ 3, respectively. The number of participants reporting

exercise at each timepoint were 29, 28, and 18, respectively. There were no differences in sleep duration or PSQI scores between those who exercised and those who did not ($p > 0.05$). Furthermore, there were no significant associations between weekly exercise frequency and sleep duration or PSQI ($p > 0.05$).

Conclusion: In this sample, participants experienced poor sleep quality throughout the perinatal period. Additionally, the number of participants exercising decreased from pregnancy to postpartum. However, exercising was not associated with subjective sleep duration or quality during the perinatal period. Future studies identifying strategies for improving sleep duration and quality during the perinatal period are needed.

Support (if any): NICHD R15HD102904 (Okun)

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0402

THE COST OF SELF-RELIANCE: FIREFIGHTERS' PERSPECTIVES TOWARD SLEEP COACHING

John Richmond Sy¹, Ashley Bohan¹, Erin Rael¹, Dana Epstein², Matthew Buman², Daniel Taylor¹, Michael Grandner¹, David Glickenstein¹, Patricia Haynes¹

¹University of Arizona, ²Arizona State University

Introduction: Sleep coaching, based on Cognitive Behavioral Therapy for Insomnia (CBTi), may be an effective intervention for

firefighters' sleep problems. However, little is known about how firefighters perceive such coaching. Given that self-reliance is linked to lower intentions to seek professional help, this study examined the relationships among self-reliance, stigma toward sleep coaching, and perceptions of its effectiveness.

Methods: Participants included firefighters ($N = 314$) from 20 Arizona fire agencies, recruited through the Sleep Assistance for Firefighters (SAFFIRE) study. They completed a survey assessing self-reliance, stigma toward sleep coaching, and perceived effectiveness, adapted from the Determinants of Mental Health Treatment Seeking questionnaire. While controlling for age and years of service, multiple regression analyses were conducted to assess whether self-reliance predicted stigma and perceived effectiveness of sleep coaching.

Results: Results indicated that firefighters with greater self-reliance had higher stigma towards sleep coaching ($B = 0.68$, $SE = 0.11$, $p < .001$, $R^2 = 0.12$). They were also less likely to view sleep coaching as an effective intervention ($B = -0.75$, $SE = 0.08$, $p < .001$, $R^2 = 0.23$).

Conclusion: Our findings indicated that self-reliance is negatively associated with firefighters' perceptions of sleep coaching. Addressing self-reliant tendencies by encouraging help-seeking behaviors may reduce stigma associated with sleep interventions and increase their adoption among firefighters.

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0403

PLASMA MELATONIN PROFILING IN INSOMNIA DISORDER AND GOOD SLEEPERS

Holly Barilla, Aalim Weljie, Arjun Sengupta, Matthew Kayser, Philip Gehrman

University of Pennsylvania

Introduction: Research on the role of circadian rhythms in Insomnia Disorder are mixed. Some studies in small samples have found alterations in melatonin patterns, with reduced levels at night compared to good sleepers, while other studies have failed to confirm these patterns. It can be difficult to draw conclusions because most studies either used melatonin sampling only at night or did not control for lighting levels. The current study examined group differences in melatonin secretion over two days in controlled settings.

Methods: Forty subjects (20 good sleepers, 20 with insomnia) were recruited to spend 4 nights in a laboratory setting as part of a larger study. Subjects (50% male, 50% female, mean age (SD)=33.5 (7.2)) were kept for 48 hours in light settings below 100 lux and had an IV placed for blood sampling every 2 hours over a 48-hour period. Plasma samples were analyzed with a melatonin radioimmunoassay. Melatonin profiles were modeled with a cosinor analysis to compute mesor, acrophase, and amplitude.

Results: Melatonin parameters did not differ significantly between good sleeper and those with insomnia. Although the insomnia group had a higher mesor value ($M=108.32$, $SD=103.95$) than good sleepers ($M=77.07$, $SD=59.02$), this difference was not statistically significant ($p=0.33$). Amplitude between good sleepers ($M=294.66$, $SD=742.40$) and those with insomnia ($M=107.69$, $SD=81.12$) was also not significant ($p=0.34$). Finally, acrophase values were nearly identical between participants with insomnia ($M=4.15$, $SD=3.47$) and healthy subjects ($M=4.28$, $SD=3.07$) ($p=0.92$).

Conclusion: The current findings suggest that Insomnia Disorder may not be strongly associated with abnormalities in circadian rhythms of melatonin at the group level. However, the variability observed in melatonin parameters, particularly mesor and amplitude, suggests individual variability that may hide clinically relevant subpopulations. These findings are consistent with clinical trial evidence showing that exogenous melatonin administration is generally not effective for most individuals with insomnia, though some may benefit.

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0404

UNDERSTANDING SUBJECTIVE-OBJECTIVE SLEEP DISCREPANCY IN CHRONIC INSOMNIA: A CONTINUOUS MODELRubén Herzog¹, Flynn Crosbie², Anis Aloulou³, Umaer Hanif³, Mounir Chennaoui⁴, Damien Léger³, Thomas Andrillon¹

¹Sorbonne University, Institute of the Brain – Paris Brain Institute (ICM), Inserm, CNRS, ²INSEP (French National Institute of Sport, Expertise and Performance), ³Paris Cité University, VIFASOM (Vigilance, Fatigue, Sleep and Public Health), ⁴IRBA (Institut de Recherche Biomédicale des Armées)

Introduction: Insomnia is among the most prevalent sleep disorders, yet current clinical frameworks struggle to explain why

many patients report poor sleep despite apparently normal polysomnography (PSG). This mismatch, known as subjective-objective sleep discrepancy (SOSD), complicates diagnosis and treatment. Conventional staging collapses sleep into categorical states and may overlook continuous dynamics. This study introduced a probabilistic, information-theoretic approach to characterize sleep as a continuum, aiming to explain insomnia subtypes and the mechanisms underlying SOSD.

Methods: PSG recordings from 904 individuals with chronic insomnia and 104 good sleepers were analysed. Instead of assigning each epoch to a single stage, a hypnodeltensity approach generated probability distributions across Wake, N1, N2, N3 and REM. From these time series, two metrics were derived. The first, intrusion, captured the extent of mixing across sleep-wake probabilities during a given epoch. The second, instability, quantified abrupt changes from one epoch to the next. Participants were grouped as good sleepers, insomnia without subjective-objective discrepancy, and insomnia with discrepancy. Group differences were tested using regression models, while machine-learning classifiers evaluated diagnostic performance. Associations with spectral EEG power and conventional PSG outcomes were examined.

Results: Both insomnia groups showed higher levels of intrusion and instability than healthy sleepers, indicating more mixed and unstable sleep-wake dynamics. However, the patterns underlying these abnormalities differed. Individuals with insomnia and SOSD exhibited prominent wake intrusions during sleep, accompanied by increased beta and gamma EEG activity, whereas those with insomnia but no SOSD displayed greater sleep intrusions during wakefulness, associated with elevated delta and theta activity. A model based solely on intrusion and instability measures reliably distinguished the three groups, achieving strong classification accuracy, and these markers predicted traditional PSG outcomes including sleep efficiency, WASO and total sleep time.

Conclusion: A continuous, probabilistic representation of sleep reveals that insomnia and subjective-objective discrepancy exist along a spectrum rather than as discrete categories. Intrusion and instability capture meaningful neurophysiological differences between insomnia phenotypes and provide an interpretable bridge between subjective complaints and objective PSG features. This framework offers a scalable approach for improved phenotyping, clinical stratification, and potentially treatment selection in insomnia.

Support (if any):

Abstract citation ID: zsag091.0405

0405

PANDORE-IA EVALUATION OF AUTOMATED SLEEP STAGING ALGORITHMS IN 904 INSOMNIA PATIENTSUmaer Hanif¹, Anis Aloulou¹, Flynn Crosbie², Paul Bouchequet¹, Mounir Chennaoui³, Thomas Andrillon⁴, Damien Léger¹

¹Paris Cité University, VIFASOM (Vigilance, Fatigue, Sleep and Public Health), ²INSEP (French National Institute of Sport, Expertise and Performance), ³IRBA (Institut de Recherche Biomédicale des Armées), ⁴Sorbonne University, Institute of the Brain – Paris Brain Institute (ICM), Inserm, CNRS

Introduction: Polysomnography remains essential for identifying sleep disorders, but the manual scoring required to analyse these recordings is time-consuming and resource-heavy. Although automated sleep scoring offers an alternative, their

performance can vary drastically from one sleep-disorder type to another. The present work examined how current state-of-the-art classifiers perform when applied to insomnia patients.

Methods: PSG data from 904 individuals with chronic insomnia were analysed. Five automated staging algorithms were compared: GSSC, U-Sleep, Luna, STAGES, and YASA. Their classification accuracy was assessed using macro F1 scores, confusion matrices, and predicted sleep parameters. Regression models were used to test whether demographic variables, sleepiness levels, or PSG characteristics influenced performance.

Results: Performance varied across classifiers. GSSC obtained the highest overall F1 score across sleep stages (0.66), followed by U-Sleep (0.62), Luna (0.56), STAGES (0.54), and YASA (0.52). GSSC also obtained the highest per-stage F1 scores for Wake (0.83), N2 (0.80), N3 (0.71), and REM (0.76), and was matched by U-Sleep in N1 and REM, and by Luna in N3. The poorest results were observed in deep sleep for STAGES (N3 = 0.39) and for REM in YASA (F1 = 0.35). Typical errors involved confusion between N1 and Wake/N2, and between N3 and N2. REM was frequently misclassified as Wake or light NREM by STAGES, Luna, and YASA. GSSC and U-Sleep showed the least variation across demographic subgroups, whereas STAGES and Luna were more affected. Algorithm performance was similar in patients with and without PSG-defined insomnia. Among sleep metrics, U-Sleep showed the best agreement for total sleep time ($R^2 = 0.88$), STAGES for sleep onset latency ($R^2 = 0.82$), and GSSC for wake after sleep onset ($R^2 = 0.82$).

Conclusion: Automated staging systems show reliable but uneven accuracy when applied to chronic insomnia. GSSC and U-Sleep consistently outperformed the other classifiers and demonstrated the lowest demographic bias. The results indicate that automated staging can be used in large-scale clinical datasets, although the choice of algorithm remains critical when interpreting sleep stages and derived metrics in patients with insomnia.

Support (if any):

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0406

BEDTIME TECHNOLOGY USE AND SLEEP HEALTH AMONG RURAL APPALACHIAN ADULTS: FINDINGS FROM THE REST-KY STUDY

Maliha Mehnaz Mitu¹, Daniela Moga¹, Emily Slade¹, Joon Chung², Michael Grandner³, Mairead Moloney²

¹University of Kentucky, ²University of Miami Miller School of Medicine, ³University of Arizona

Introduction: Rural Appalachian populations experience significant sleep health disparities, yet little is known about how bedtime technology use affects multidimensional sleep health in these communities. This study examined associations between specific bedtime technology behaviors and overall sleep health, as well as individual sleep health dimensions, among adults in rural Eastern Kentucky.

Methods: Survey data from participants in the "Researching Equitable Sleep Time in Kentucky Communities" (REST-KY) study (N=315) were analyzed. We used the National Sleep Foundation's 2011 "Sleep in America" poll to assess bedtime technology behaviors including social networking sites, working on computer, and computer/laptop use. Technology use was dichotomized as "often" (every/almost every night or few nights weekly) versus "rarely/never." Sleep health was measured using an expanded version of the Ru-SATED framework (i.e., the original components of

regularity, satisfaction, alertness, timing, efficiency, and duration + sleep irregularity and social jetlag). Including wake after sleep onset (WASO) yielded both a continuous sleep health score and binary indicators of favorable versus non-favorable sleep health. We conducted bivariate analyses followed by multivariable linear regression models for overall sleep health and logistic regression models for individual sleep dimensions, adjusting for employment, sex, age, income, sleep medication use, anxiety/depression, and living alone.

Results: In adjusted models, social networking site use and two separate computer related items remained significantly associated with lower sleep health scores. Participants who rarely/never used social networking sites had 0.71-unit higher sleep health scores compared to frequent users ($p=0.018$). Those who rarely/never worked on a computer had 0.88-unit higher scores ($p=0.002$). Computer/laptop use showed statistically significant associations after adjustment (0.51-unit difference, $p=0.039$). Dimension-specific analyses revealed that individuals who rarely/never used social networking sites had higher adjusted odds of favorable sleep timing and duration, and those who rarely/never worked on a computer had higher odds of favorable alertness and duration irregularity.

Conclusion: Interactive and work-related bedtime technology behaviors are independently associated with poorer sleep health in rural Appalachian adults, with effects varying across specific sleep dimensions. Social networking sites and computer work show particularly robust associations, suggesting these behaviors as potential intervention targets for improving sleep health in this vulnerable population.

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0407

NIGHT OWLS AND NUTRITION: HOW INSOMNIA MEDIATES THE CHRONOTYPE-DIET RELATIONSHIP IN RURAL APPALACHIA

Alexander Gonzales¹, Emily Slade², Daniela Moga², Joon Chung³, Maliha Mehnaz Mitu², Michael Grandner⁴, Mairead Moloney³

¹University of Miami, ²University of Kentucky, ³University of Miami Miller School of Medicine, ⁴University of Arizona

Introduction: Eveningness, the preference for later sleep and wake times, is associated with shorter sleep duration, poorer sleep quality, and suboptimal dietary choices. While both chronotype and sleep disturbances independently influence diet quality, their interrelationship remains poorly understood, particularly in rural populations experiencing health disparities. This study examines whether insomnia severity mediates the relationship between chronotype and diet quality among rural Appalachian adults.

Methods: We analyzed data from 295 adults (ages 18+) participating in the Researching Equitable Sleep Time in Kentucky Communities (REST-KY) study across twelve economically distressed Eastern Kentucky counties. Participants were recruited via convenience sampling and completed self-administered baseline surveys in REDCap assessing diet quality using the Rapid Eating Assessment for Participants-Shortened (REAP-S), chronotype using the Morningness-Eveningness Questionnaire (MEQ), and insomnia symptoms using the Insomnia Severity Index (ISI). Statistical analyses were conducted using R version 4.2.0. Pearson correlations examined bivariate associations between continuous variables. Mediation analysis tested whether insomnia

symptoms mediate the chronotype-diet quality relationship, with bootstrapped 95% confidence intervals (10,000 simulations) estimating indirect, direct, and total effects. All paths were adjusted for sex, age, income, education, and living alone.

Results: Participants were predominantly female (73.9%), aged 45.7±12.9 years, and living with others (80.3%). Pearson correlations revealed modest positive associations between eveningness and insomnia severity ($r=-0.31$) and between diet quality and insomnia severity ($r=-0.25$), and a modest negative association between eveningness and diet quality ($r=0.32$). The adjusted mediation model demonstrated a significant total effect of chronotype on diet quality ($p<0.001$). The indirect effect indicated that later chronotype (eveningness) was associated with poorer diet quality through lower insomnia symptoms ($p=0.009$). Eveningness was also directly associated with poorer diet quality independent of insomnia ($p=0.001$). Approximately 17% of the chronotype effect on diet quality was mediated through insomnia severity.

Conclusion: Among rural Appalachian adults, eveningness is associated with poorer diet quality, with insomnia severity partially mediating this relationship. These findings suggest that interventions targeting sleep timing and insomnia symptoms may improve dietary behaviors in this vulnerable population, offering potential pathways for addressing multiple health disparities simultaneously.

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0408

INSOMNIA SEVERITY DIFFERENCES BY PSILOCYBIN, LSD, AND DMT USE STATUS AMONG YOUNG ADULT DAILY CANNABIS CONSUMERS IN THE HERBAL HEART STUDY

Denise Vidot¹, Bria-Necole Diggs¹, Amrit Baral², Michelle Thompson³, Girardin Jean-Louis¹

¹University of Miami, ²Johns Hopkins University, ³Lehigh University

Introduction: Psychedelic use and interest in its therapeutic potential are rapidly increasing; yet its relationship with insomnia remains poorly understood. This study aims to estimate differences in insomnia severity by type of psychedelic consumed among a cohort of 18-to-35-year olds.

Methods: Data are from the Herbal Heart Study - Sleep Ancillary (N=100) cannabis consumers. Psilocybin, lysergic acid diethylamide (LSD), and N,N-dimethyltryptamine (DMT) was self-reported. Insomnia and sleep problems were assessed via the Insomnia Severity Index: no clinical insomnia (< 7), subthreshold clinical insomnia (8-10), moderate-severity clinical insomnia (15-21), and severe clinical insomnia (> 22). Measures were self-reported via REDCap. Chi-square tests, Fisher's Exact tests, and independent t-tests were conducted where appropriate.

Results: Among daily cannabis consumers, 55.6% reported lifetime history of psychedelics, of which 42.9% reported past-year consumption. Psilocybin was the most prevalent (50.0%), followed by LSD (29.3%) and DMT (3.5%). Overall, 33.3% met criteria for subthreshold insomnia; 3.2% for moderate severity clinical insomnia; and 1.6% for severe clinical insomnia. There were differential associations between insomnia and psychedelic types ($p<0.05$). LSD: 17.7% had moderate-to-severe-clinical-insomnia vs. 0.0% of

non-LSD, $p=0.006$); DMT: 50.0% had moderate-to-severe-clinical-insomnia vs. 3.6% of non-DMT ($p=0.004$); Psilocybin: 10.3% had moderate-to-severe-clinical-insomnia vs. 0.0% of non-psilocybin ($p=0.07$). Sleep problems interfered with daily functioning more frequently among LSD consumers (16.6%) than non-LSD consumers (2.8%, $p=0.01$). There were no differences consuming cannabis for sleep ($p=0.70$), or demographics [age: 26.9y (SD: 4.56) vs. 27.2y (SD: 5.56), $p=0.81$, sex: 60.0% vs 60.7% female, $p=0.95$; or ethnicity: 68.6% vs. 57.1% Hispanic/Latino, $p=0.26$] by psychedelic use.

Conclusion: LSD and DMT were associated with clinical insomnia; and LSD consumers reported greater sleep problem interference in daily functioning. Longitudinal studies are warranted to evaluate causal effects and long-term sleep outcomes. Given the high burden of insomnia in this population, understanding psychedelic-specific associations with insomnia is essential for clinical and harm-reduction guidelines.

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0409

ASSOCIATION BETWEEN MILK TEA INTAKE AND INSOMNIA AMONG NURSES: A LONGITUDINAL STUDY

Meng Ning¹, Yamin Li², Wing-Fai Yeung¹

¹Hong Kong Polytechnic University, ²Hunan Provincial People's Hospital (The First Affiliated Hospital of Hunan Normal University)

Introduction: Milk tea has served as one of the most popular sugar-sweetened beverage among adults, including nurses. However, few studies have investigated the potential effects of milk tea consumption on long-term sleep among nurses. We aimed to examine the impacts of milk tea consumption level and changes in frequency on insomnia among nurses.

Methods: This longitudinal study analyzed data from 84,252 participants from the Nurses' Mental Health Studies in China. Insomnia status was defined as long-term healthy, new-onset, recovery, and chronic insomnia based on assessments at baseline and one year follow-up. Milk tea consumption was categorized as never, less than 1, 1-2, 3-6, and 7+ cups per week. Multiple logistic models were used to examine the effects of milk tea consumption on insomnia, adjusting for demographic, work-related, lifestyles, and mental health factors. Marginal effects models were employed to estimate predicted probabilities of insomnia outcomes.

Results: The prevalence of long-term healthy, new-onset, recovery, and long-term chronic insomnia was 60.2%, 16.2%, 9.3%, and 14.3%, respectively. Nurses with long-term chronic insomnia were more likely to be characterized as female, engaging in night-shift work, high levels of depressive symptoms, anxiety symptoms, fatigue and loneliness. Compared with not consuming any milk tea, intake less than 1 cup per week was associated with lower risk of new-onset insomnia (adjusted risk ratio [aRR]=0.84, predicted probability 15.8%) and chronic insomnia (aRR=0.94, predicted probability 14.1%). In contrast, those taking in 3 to 6 cups per week had higher risk of chronic insomnia (aRR=1.17, predicted probability 16.3%). Increased consumption from baseline to follow-up was associated with higher risk of new-onset insomnia (aRR range: 1.23-2.66), while decreased consumption had stronger

associations with lower risk of chronic insomnia (aRR range: 0.42-0.92).

Conclusion: This large-sample longitudinal study found that milk tea consumption was significantly associated with the risk of developing new-onset insomnia and chronic insomnia among nurses. Reducing high levels of milk tea intake may be a potential strategy to improve sleep health in the population.

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0410

CHARACTERIZING POSTPARTUM SLEEP AND THE PREVALENCE OF POSTPARTUM INSOMNIA DISORDER

Moe Takenoshita¹, Arash Jalali-Sohi², Nathan Hidajat¹, Rachel Manber³, Nan Guo¹, Guillermina Michel¹, Rania El-Khateb⁴, Jill Mhyre⁴, David Cella⁵, Sara Shaunfield⁵, Xiaodang Tang⁵, Suzan Carmichael¹, Lu Tian¹, Sarah Ciechanowicz¹, Pervez Sultan¹

¹Stanford University, ²Weill Cornell Graduate School of Medical Sciences, ³Department of Psychiatry and Behavioral Sciences, Stanford University, ⁴University of Arkansas for Medical Sciences, ⁵Northwestern University Feinberg School of Medicine

Introduction: Poor sleep in the postpartum period is linked to adverse maternal and infant outcomes. However, the prevalence of insomnia disorder in this population remains unclear with estimates ranging from 1.3% to 59.6%(Sultan 2022, Sivertsen 2015). We aimed to determine the prevalence of insomnia disorder and characterize sleep (sleep disturbance (SD) and sleep-related impairment (SRI)) at 6 weeks postpartum.

Methods: Following IRB approval, patients were recruited in a longitudinal prospective cohort study evaluating newly adapted postpartum PROMIS-SD and SRI surveys. Adults who had delivered a live infant via any delivery mode were approached during delivery admission at two US hospitals (CA and AR) and invited to complete three surveys (Bergen Insomnia Scale(BIS),PROMIS-SD and SRI) at 6 weeks postpartum. Participants were also invited to complete virtual 1 hour structured clinical interviews diagnostic for sleep disorders(SCISD-R, the criterion standard for diagnosing sleep disorders), at 6 weeks postpartum until 150 interviews were completed. Demographic, clinical, and neonatal variables were collected. Primary outcome was prevalence of insomnia disorder based on SIDSD-R. Secondary outcomes were sleep characteristics (sleep satisfaction, quality, duration, latency, awakenings) and survey scores. Descriptive statistics were used to report findings.

Results: 150 of 413 invited patients (36.3%) completed SCISD-R at 44±7 days postpartum. Among the interviewees, 68 had spontaneous vaginal, 7 operative vaginal, 43 planned and 30 unplanned caesarean deliveries. Mean age was 33±5 years. Through SCISD-R, insomnia disorder was diagnosed in 20 (13%) participants, but only two had received any clinical evaluation for insomnia. Among the 144 surveys completed, median BIS was 20[IQR 14-27], PROMIS-SD T score was 51[IQR 45-56], and SRI T score was 57[IQR 50-62], suggesting normal SD and mild SRI in most participants. "Poor" or "very poor" sleep quality was reported by 29%(43/150), and 51%(74/144) reported they were "not at all" or only "a little" satisfied with their sleep. 85% (129/150) patients reported sleeping < 7 hours a night. Sleep latency ≥30 minutes was reported in 20%(30/150), and 84% (126/150) reported waking 1-4 times nightly.

Conclusion: Insomnia disorder prevalence at 6 weeks postpartum was 13% using SCISD-R. Most cases were undiagnosed. Improved identification of insomnia disorder in the postpartum period is necessary.

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0411

DYSFUNCTIONAL BELIEFS ABOUT SLEEP AND SLEEP MISPERCEPTION IN ADULTS WITH INSOMNIA SYMPTOMS

Colin Echeverri¹, Jennifer Goldschmied¹, Holly Barilla¹, Nayeli Nunez Cruz¹, Katherine Jonas², Roman Kotov², Philip Gehrman¹

¹University of Pennsylvania, ²Stony Brook University

Introduction: In adults with insomnia, a common characteristic is a discrepancy between perceived and objectively measured sleep. The mechanisms of this discrepancy are not known but it may reflect increased cognitive arousal. Cognitive arousal can vary both in terms of quantity as well as content, with individuals with insomnia often reporting dysfunctional beliefs about sleep. However, the role of these separate components of cognitive arousal have not been investigated. The current pilot study aimed to explore these psychological factors and their impact on sleep misperception, with the hypothesis that higher levels of dysfunctional beliefs would be associated with greater negative sleep misperception in terms of underestimation of sleep time.

Methods: Participants with insomnia symptoms (N=32) completed the Dysfunctional Beliefs and Attitudes About Sleep (DBAS), Insomnia Severity Index (ISI), Patient-Reported Outcomes Measurement Information System Sleep Disturbance (PROMIS-Sleep Disturbance), and Pre-Sleep Arousal Scale (PSAS), along with a morning sleep diary corresponding after in-home polysomnography (PSG). PSG was scored according to standard guidelines to compute total sleep time (TST), sleep onset latency (SOL), and wake after sleep onset (WASO). Subjective estimates of these corresponding metrics were used to compute misperception scores (for example, diary-reported TST minus PSG-recorded TST). Pearson correlation coefficients were then computed to examine associations between psychological measures and sleep misperception severity.

Results: DBAS scores were negatively correlated with TST misperception ($r=-.366$, $p = .047$) but were not significantly correlated to SOL or WASO misperception. ISI scores were positively correlated with SOL misperception ($r=.431$, $p = .014$) and negatively correlated with WASO misperception ($r=-.470$, $p = .007$). PROMIS and PSAS scores were not significantly correlated to TST, SOL, or WASO misperception.

Conclusion: Findings suggest that individuals endorsing stronger dysfunctional sleep beliefs tended to underestimate their total sleep time, consistent with a negative correlation between DBAS scores and TST misperception. Additionally, broader insomnia severity was correlated to misperceptions of overestimating sleep latency times and underestimating wake after sleep onset times. Taken together, these patterns highlight the potential value of targeting maladaptive sleep-related cognitions within cognitive-behavioral interventions to help reduce distorted sleep perceptions and improve clinical outcomes.

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0412

EVALUATION OF PROMIS SLEEP DISTURBANCE ITEM BANK FOR POSTPARTUM INSOMNIA DISORDER SCREENING

Nathan Hidajat¹, Moe Takenoshita¹, Guillermina Michel¹, Arash Jalali-Sohi², Rachel Manber³, Deirdre Iyell¹, Jill Mhyre⁴, David Cella⁵, Sara Shaunfield⁵, Sean Mackey¹, Lu Tian¹, Suzan Carmichael¹, Xiaodang Tang⁵, Pervez Sultan¹

¹Stanford University, ²Weill Cornell Graduate School of Medical Sciences, ³Department of Psychiatry and Behavioral Sciences, Stanford University, ⁴University of Arkansas for Medical Sciences, ⁵Northwestern University Feinberg School of Medicine

Introduction: Impaired sleep experience in the postpartum period is associated with negative maternal and infant outcomes. Insomnia is common yet underdiagnosed following childbirth. Prevalence varies widely depending on the insomnia measurement tool used, and few have been validated in the postpartum population. We aimed to assess the diagnostic accuracy of sleep surveys (Bergen Insomnia Scale (BIS), PROMIS Sleep Disturbance (SD) and Sleep-Related Impairment (SRI)) compared to diagnostic clinical interviews for sleep disorders (SCISD-R).

Methods: After IRB approval, adults who delivered a live infant were recruited in a longitudinal prospective cohort study. Patients were approached during delivery admission at two hospitals (CA and AR) and invited to complete BIS, PROMIS SD and SRI at 6 weeks postpartum. Participants were also invited to complete virtual 1-hour SCISD-R interviews, the criterion standard for insomnia diagnosis, until 150 interviews were completed. Area under the ROC curve were analyzed for BIS, PROMIS SD and SRI scores against insomnia disorder. Sensitivity and specificity of PROMIS SD and SRI against SCISD-R-diagnosed insomnia disorder was evaluated with a cut-off T score of 55 (a recommended threshold) to distinguish abnormal SD and SRI cases.

Results: 150 of the 413 (36.3%) invited participants completed SCISD-R at mean 43.6±6.6 days postpartum, with mean interview duration 24.6±9.7 minutes. Of these, 144 (96.0%) participants completed PROMIS SD, SRI and BIS. 20 individuals (13.3%) met criteria for insomnia disorder. AUC for BIS raw score, PROMIS SD and SRI T scores were 0.73, 0.85 and 0.70 respectively. At a PROMIS SD cut-off T score of 55, sensitivity was 0.75 (95.0% CI 0.509, 0.913) and specificity was 0.758 (0.673, 0.830). For PROMIS SRI, sensitivity at cut-off T score of 55 was 0.75 (0.509, 0.913), and specificity was 0.45 (0.36, 0.54).

Conclusion: The ranked order of discrimination for insomnia disorder compared to criterion standard diagnostic interviews was PROMIS SD, BIS and SRI (best to worst). PROMIS SD should be considered for screening for insomnia disorder following childbirth.

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0413

IMPACT OF INSOMNIA ON OBSTRUCTIVE SLEEP APNEA IN A GENERAL SLEEP MEDICINE CLINIC

Samuel Mastel¹, Hannah Fitterman-Harris², McDowell Anderson¹, Sagarika Nallu¹, Elizabeth Rivera², Laiheng Maldonado¹, Katie Tribuls¹, Deborah Holderman³, William Beauchamp³

¹USF Morsani College of Medicine, ²USF Morsani College of Medicine/Tampa General Hospital Psychology, ³USF Morsani College of Medicine/Tampa General Hospital Sleep Center

Introduction: Among patients diagnosed with obstructive sleep apnea (OSA), 20-30% have comorbid insomnia. OSA can result in patients waking up gasping/choking. Once awake, patients with comorbid insomnia may have difficulty falling back asleep. Continuous positive airway pressure (CPAP) is the gold standard treatment of OSA. With effective treatment of OSA, patients may be less likely to wake up and therefore may have decreased symptoms of insomnia and daytime sleepiness. The purpose of the current quality improvement (QI) project is to determine the prevalence of excessive daytime sleepiness (EDS) and comorbid insomnia symptoms among patients with OSA in a sleep disorders clinic within an academic health center. Determining these prevalence rates will establish a foundation for future QI projects to optimize treatment for OSA and comorbid insomnia.

Methods: Participants (N = 47) with a diagnosis of or suspected OSA completed the Insomnia Severity Index (ISI) for insomnia symptoms and the Epworth Sleepiness Scale (ESS) to assess EDS at their sleep medicine visit. When available, PAP usage data was evaluated via smartcard downloads from the computer-based platform and patient device for the same medical visit.

Results: Participants were more likely to have severe OSA (38.3%), identify as White (63.8%), and be male (58.3%). Twenty-five participants (53.2%) scored within the Clinical Insomnia (Moderate or Severe) category on the ISI, and 19 scored within the Excessively Sleepy or May Be Excessively Sleepy category on the ESS (47.5% of the 40 patients who completed the scale). Fourteen patients (51.9% of the 27 whose PAP usage data was available) wore their PAP at least 90% of the days and 8 (29.6%) wore their PAP for at least 4 hours per night at least 90% of the time.

Conclusion: This initial phase of our ongoing QI project identifies insomnia as a potential comorbid condition that could negatively impact treatment of OSA. Further QI evaluations should include the bidirectional impact of insomnia treatment with CPAP therapy of OSA.

Support (if any):

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0414

INSOMNIA AS AN EMERGING DETERMINANT OF DEPRESSION AND ANXIETY IN THE UNITED STATES: POPULATION PROJECTIONS THROUGH 2050

Emerson Wickwire¹, Fatima Sert-Kuniyoshi², Kimberly Sterling², Elroy Boers³

¹University of Maryland School of Medicine, ²Resmed Science Center, ³Resmed

Introduction: Insomnia is highly prevalent in the United States (U.S.) and is strongly associated with mental health morbidity, particularly depression and anxiety disorders. However, the long term population burden of insomnia and its potential contribution to future trends in depression and anxiety have not been quantified. Understanding these trajectories is important for informing population health planning and developing prevention strategies that can improve mental health outcomes.

Methods: We projected U.S. trends in insomnia, depression, and anxiety from 2020 to 2050 using an empirically calibrated

population simulation in five year cycles. The model incorporated demographic aging along with age and sex specific incidence, remission, comorbidity, and mortality. Baseline prevalences of insomnia at 16.2 percent and severe insomnia at 7.9 percent were drawn from recent United States and global data sets. Incidence probabilities were taken from longitudinal cohort studies and adjusted with scaling factors to maintain epidemiologic plausibility. Remission rates and chronicity progression were based on published longitudinal evidence. Associations between insomnia and mental health outcomes were parameterized using published odds ratios near three point five for depression and two point six for anxiety. These were converted to risk ratios to reduce bias given non rare baseline risks. Depression and anxiety parameters were drawn from established U.S. epidemiologic sources.

Results: In 2020, insomnia was 16.5 percent and severe insomnia was 8.1 percent. By 2050, insomnia increased by 46 percent and severe insomnia increased by 80 percent, reaching 24.1 percent and 14.6 percent. During the same period, depression increased from 5.9 percent to 9.4 percent and anxiety increased from 13.6 percent to 19.3 percent. Among individuals with insomnia, comorbid depression and anxiety reached 12 to 13 percent and 26 to 29 percent. In 2050, insomnia contributed to a 10 to 15 percent higher prevalence of depression and a 15 to 20 percent higher prevalence of anxiety relative to a scenario without insomnia.

Conclusion: By 2050, the rising prevalence of insomnia, particularly severe insomnia, is projected to elevate the future burden of depression and anxiety. Early identification, long term management, and population level prevention of insomnia may help improve mental health outcomes in the U.S..

Support (if any): Resmed

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0415

INTRA-INDIVIDUAL VARIABILITY IN SLEEP AND INSOMNIA SEVERITY IN A SHIFT-WORKING NURSING STAFF SAMPLE

Hsiao-Jui Lin, Miles Evanisko, Jessica Dietch
Oregon State University

Introduction: Greater intraindividual variability (IIV) in sleep parameters (e.g., total sleep time [TST], bedtime [BT], wake time [WT]) is associated with worse sleep outcomes, including more severe insomnia symptoms, maladaptive sleep-related cognitions, and greater fatigue. Greater IIV has also been linked to worse physical and mental health outcomes. Shift workers comprise roughly 15% of the workforce and experience chronically elevated IIV in sleep imposed by their work schedule. Few studies have examined whether IIV predicts insomnia severity in this context of work-driven sleep variability, particularly using repeated, within-person measures. To address this gap, the current study examined associations between IIV in sleep parameters and insomnia severity.

Methods: Participants were shift-working nursing staff who took part in a parent study. Participants completed baseline questionnaires and 14 daily sleep diaries. From these data, we derived four nightly sleep variables, used as independent variables: 24-hour TST (sum of all sleep episodes within 24 hours), longest sleep episode TST, longest sleep episode BT and WT. Insomnia symptoms were assessed with the Insomnia Severity Index (ISI), used as a dependent variable. To model intraindividual variability

(IIV), we used the Bayesian Variability Model implemented in the varian package ("V -> Y" design).

Results: Across models, greater IIV in sleep parameters was not associated with insomnia severity. Greater mean 24h TST was robustly associated with less insomnia severity ($\beta = -2.14$, 95% CrI [-4.15, -0.33], $p_{\text{emp}} = .02$). No other mean sleep parameter was associated with insomnia severity.

Conclusion: Contrary to prior research in non-shift workers, our analyses suggest that IIV in sleep parameters was not associated with ISI, whereas greater 24h TST was associated with less ISI. Though further investigation is needed, one possible explanation is that this discrepancy reflects differences in the degree of control individuals have over their daily schedules. Future research should also investigate whether increased TST, independent of variability, improves insomnia symptoms among shift workers.

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0416

LIVING IN AN ETHNIC ENCLAVE IS ASSOCIATED WITH REDUCED RISK OF INSOMNIA AMONG ASIAN AMERICANS

Sunmin Lee¹, Brittany Morey¹, Yuxi Shi¹, Susan Redline², Suzanne Bertisch², Ichiro Kawachi³

¹University of California, Irvine, ²Brigham and Women's Hospital,

³Harvard Chan School of Public Health

Introduction: Neighborhood social and socioeconomic contexts have been linked to insomnia, but few studies have examined this association among Asian Americans, especially the role of ethnic enclaves.

Methods: The cross-sectional study consisted of 256 Chinese-, 256 Korean- and 267 Vietnamese Americans aged 30+ years in Southern California. We assessed neighborhood characteristics (residential segregation, ethnic enclaves, neighborhood socioeconomic status [nSES]) using geocoded data and neighborhood perceptions (safety, friendliness, social cohesion) by survey. Insomnia was measured using the Insomnia Severity Index (ISI), categorized into no clinically significant insomnia (0-7), subthreshold insomnia (8-14), and moderate/severe insomnia (≥ 15). Multinomial logistic regression was used to examine associations between neighborhood factors and insomnia, adjusting for age, sex, Asian origin, marital status, education, income, employment status, and population density.

Results: Results 14.8% reported moderate/severe insomnia. Compared to Asian Americans living in neighborhoods with a lower ethnic enclave index score, those with a higher score had 50% lower odds of moderate/severe insomnia (OR= 0.50, 95% CI: 0.31, 0.79) after adjustment. Report of less friendly neighbors was associated with higher odds of moderate/severe insomnia (OR=2.27, 95% CI: 1.08, 4.77), and feeling safe in one's neighborhood 'all of the time' was marginally associated with 42% lower odds of moderate/severe insomnia compared to feeling safe "none/some of the time" (OR=0.58, 95% CI: 0.31, 1.07, $p < 0.1$). Contrary to our hypothesis, higher neighborhood social cohesion was positively associated with subthreshold insomnia (OR=1.36, 95% CI 1.11, 1.67), and marginally associated with higher moderate/severe insomnia (OR=1.28, 95% CI: 0.99, 1.65, $p < 0.1$). This finding could be potentially due to the significant correlation we found between social cohesion and negative social support ($r=0.07$, $p < 0.05$). Interaction test results indicate that the association between living in an ethnic enclave and lower odds of moderate/severe insomnia was

especially pronounced among individuals with lower educational attainment, and the association between higher social cohesion and higher odds of insomnia was present for Korean and Vietnamese Americans, but not for Chinese Americans.

Conclusion: Insomnia among Asian Americans appears to reflect a mix of protective effects of living in ethnic enclaves as well as the “dark side” of social cohesion (negative social support).

Support (if any):

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0417

OBJECTIVE, BUT NOT SELF-REPORTED SHORT SLEEP DURATION INCREASES MORTALITY RISK IN PATIENTS WITH INSOMNIA: THE WISCONSIN SLEEP COHORT

Yun Li¹, Yanyuan Dai¹, Alexandros Vgontzas²

¹Shantou University Mental Health Center, ²Penn State College of Medicine

Introduction: Insomnia with objective, but not self-reported short sleep duration has been reported to be associated with cardiometabolic comorbidities. We aimed to investigate the association between insomnia with objective or self-reported and mortality in a general population sample.

Methods: From the Wisconsin Sleep Cohort 373 subjects with insomnia symptoms and 394 subjects without insomnia symptoms with a median follow-up duration of 8 years were included. Insomnia symptoms were defined as the presence of difficulty in falling sleep, maintaining sleep or early awakening for more than 5-15 times/month. Objective short sleep duration was defined as total sleep time < 6 hours based on polysomnography. Self-reported short sleep duration was defined as < 7.2 hours based on the median self-reported habitual sleep duration of the overall sample.

Results: Insomnia symptoms with objective short sleep duration were associated with a 2.6-fold higher risk of all-cause mortality (hazard ratio [HR]=2.57, 95% confidence interval [95%CI]=1.12-5.89) compared to subjects without insomnia symptoms and normal sleep duration (>6 hours) after controlling for confounders. Notably, this association was observed only in males (HR=3.77, 95% CI=1.19-11.97) but not in females. Furthermore, subjects with insomnia symptoms and normal sleep duration or with objective short sleep duration but without insomnia symptoms were not associated with increased risk of all-cause mortality. Finally, insomnia symptoms with self-reported short sleep duration were not associated with increased hazard of all-cause mortality.

Conclusion: Our findings support that insomnia with objective short sleep duration, which is about 50% of all insomnia patients, is the more severe insomnia phenotype. Objective short sleep duration appears to be an important marker of the biological severity of insomnia.

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0418

ONE-MONTH STABILITY IN INSOMNIA SLEEP METRICS

Ruda Lee¹, Dimitrios Mylonas², Noah Love¹, Katherine Jonas³, Roman Kotov³, Philip Gehrman¹

¹University of Pennsylvania, ²Harvard Medical School and Mass General Hospital, ³Stony Brook University

Introduction: Night-to-night variability in sleep is a hallmark of insomnia, but it remains unclear whether subjective and objective sleep metrics maintain consistent relative differences across longer timescales. We conducted a preliminary analysis in an ongoing study to examine one-month stability in subjective and objective sleep indices in individuals with insomnia symptoms.

Methods: Twenty-four participants with insomnia symptoms (62.5% female; mean age = 37.0 ± 7.0 years) completed two nights of at-home polysomnography (PSG) with a one-month interval. Two-week sleep diaries and self-report questionnaires were collected at both points. Macro-architectural features (e.g., sleep onset latency (SOL), wake after sleep onset (WASO), total sleep time (TST), sleep stage percentages, REM latency) were derived from auto-staged PSG using the YASA algorithm based on a single electroencephalography (EEG) and electrooculography (EOG) pair. Group mean differences across time points were tested using paired t-tests. Rank-order stability was examined using intraclass correlations (ICCs).

Results: ISI scores ($t(23) = 3.62$, $p = 0.001$) and several sleep stage measures changed significantly across time points (%N1: $t(23) = 2.95$, $p = 0.007$, %N2: $t(23) = 2.42$, $p = 0.02$, %REM: $t(23) = -2.69$, $p = 0.01$), whereas sleep diary indices and PSG-derived SOL, WASO, and TST showed no mean-level change. Rank-order stability estimates were moderate to high across subjective and objective measures (ICC = 0.55–0.81), except for subjective SOL and PSG-derived SOL/WASO (ICC < 0.40).

Conclusion: Subjective insomnia severity changed over one month, whereas quantitative sleep continuity metrics from both subjective and objective sources remained stable. In contrast, sleep architecture shifted significantly across time points. Despite these mean-level discrepancies, individuals retained their relative standing over time across both subjective and objective measures, suggesting a persistent component of insomnia. Future work should determine whether microstructural sleep features or subtype-specific physiology more accurately capture clinically relevant instability in insomnia.

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0419

PHENOTYPING OF INSOMNIA BASED ON A SINGLE VS. TWO NIGHTS OF POLYSOMNOGRAPHY

Alexandros Vgontzas¹, Wendy King², Daniel Buysse², Charles Morin³, Elizabeth Smith⁴, Julio Fernandez-Mendoza⁵, Stephen Wisniewski²

¹Penn State College of Medicine, ²University of Pittsburgh,

³Université Laval, ⁴National Jewish Health, ⁵Penn State University, Hershey

Introduction: In 2009, Vgontzas and his colleagues proposed phenotyping of insomnia with short sleep duration (ISSD) vs. normal sleep duration (INSD) using a cutoff point of total sleep time < 6 hours from a single night of polysomnography (PSG). Multiple studies since then have shown that the ISSD phenotype is associated with adverse health outcomes, including hypertension, diabetes, heart disease, stroke and cognitive impairment. However, a limitation of this approach is the potential misclassification based on a single night due to the “first night effect”. In this study we examined how phenotype assignment differs based on a single night vs. the mean of two nights of PSG.

Methods: SONO is an ongoing 4-site clinical trial UG3/UH3 (Hershey, Pittsburgh, Denver and Quebec City) designed to examine the modifying role of insomnia phenotyping on the efficacy of cognitive-behavioral therapy for insomnia (CBT-I) and the efficacy of trazodone vs. placebo among non-remitters to CBT-I. All participants meet diagnostic criteria for chronic insomnia disorder and report an insomnia severity index score of ≥ 10 . In this study, we included a subset of the first participants ($n=191$) enrolled in the SONO study (67% females, median age 54 (19,91) years) who had two nights of PSG at baseline. We used cross-tabulations to examine the degree of misclassification based on the first night vs. two nights (gold standard).

Results: We observed a strong agreement between night 1 vs the mean of 2 nights of PSG (85.3%). Further, in a sensitivity analysis after excluding those that the first night TST was within ± 15 minutes of the 6 hours PSG threshold ($n=31$, 16.2%), agreement between night 1 and the mean of 2 nights was 91.2%.

Conclusion: A single night of PSG is highly reliable in classifying the two insomnia phenotypes. Misclassification based on a single night PSG was between 8.8% and 14.7%, similar to other tests used routinely in sleep medicine to determine sleep apnea or daytime sleepiness (e.g., multiple sleep latency test). Finally, in-lab TST is a stable, trait-like characteristic that probably reflects a person's habitual sleep.

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0420

POST-WAKING LIGHT EXPOSURE IS ASSOCIATED WITH NEXT-NIGHT SLEEP EFFICIENCY AMONG VETERANS WITH INSOMNIA AND A HISTORY OF TRAUMATIC BRAIN INJURY

Daniel Reis

Rocky Mountain MIRECC for Veteran Suicide Prevention

Introduction: Risk for insomnia is elevated after traumatic brain injury (TBI) and can impair daily functioning. Previous research suggests that light exposure has time-of-day-dependent associations with sleep. However, longitudinal investigations into daily light exposure and subsequent sleep under naturalistic conditions are limited, and it is unclear if sleep is responsive to day-to-day variation in light exposure. Accordingly, this study sought to evaluate how between- and within-person differences in light exposure were associated with sleep efficiency during post-TBI insomnia.

Methods: This was a secondary analysis of data from 27 veterans with insomnia and past TBI. Actigraphy and sleep diaries were collected for one week. For each individual sleep episode, actigraphy-measured light was extracted for the hour following their previous awakening (i.e., post-waking) and the hour preceding the current lights-off time. Person-level means were calculated to compare average light exposure across participants. Person-scaled values, reflecting the degree to which daily light exposure differed from the participant's average, were used to evaluate within-person associations. Robust linear mixed modeling was used to estimate the associations between light exposure variables and sleep efficiency. Independent variables were person-level means and the person-scaled values for the post-waking and pre-sleep windows. Covariates included the previous night's sleep efficiency, study day, weekends, age, gender, and TBI severity.

Results: Sleep efficiency was positively associated with person-level means in post-waking light exposure ($\beta = 0.49$, $SE = 0.18$, 95% CI: 0.13 – 0.85). It was also positively associated with person-scaled post-waking light exposure ($\beta = 0.08$, $SE = 0.04$, 95% CI: 0.01 – 0.15), corresponding to $\sim 1.0\%$ greater sleep efficiency per one standard deviation increase in personal light exposure. Light exposure prior to attempting sleep was not associated with sleep efficiency. Similar results were found when exploring two- and three-hour exposure windows.

Conclusion: Participants with brighter average post-waking light exposure had higher sleep efficiency. Importantly, within-person associations were also identified, such that participants had higher sleep efficiency following days during which they were exposed to greater-than-average post-waking light. Increasing post-waking light exposure may be a powerful intervention for insomnia following TBI.

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0421

REM SLEEP AROUSABILITY AND FRAGMENTATION IN INSOMNIA WITH AND WITHOUT PSG ABNORMALITIES: A PANDORE-IA STUDY

Umaer Hanif¹, Flynn Crosbie², Anis Aloulou¹, Poul Jennum³, Geoffroy Solelhac⁴, Damien Léger¹

¹Paris Cité University, VIFASOM (Vigilance, Fatigue, Sleep and Public Health), ²INSEP (French National Institute of Sport, Expertise and Performance), ³Danish Center for Sleep Medicine, Department of Clinical Neurophysiology, Rigshospitalet, ⁴Center for Investigation and Research in Sleep (CIRS), Lausanne University Hospital (CHUV), University of Lausanne

Introduction: Chronic insomnia is diagnosed from the complaint, yet PSG is often used to verify the disorder. In many cases, patients report severe symptoms but show no measurable abnormalities during sleep recordings. This gap between experience and objective data remains poorly explained. REM sleep is particularly sensitive to arousal and may provide insight into this discrepancy. We therefore examined REM microstructure to determine whether it distinguishes insomnia cases with and without PSG-defined abnormalities.

Methods: Our database of 1049 participants, was composed of 141 good sleepers (GS), 214 insomnia without PSG abnormalities (CIN-NP), and 694 insomnia with PSG abnormalities (CIN-AP). Chronic insomnia was diagnosed by qualified doctors, specialised in sleep, according to the ICSD-3 guidelines. The data was analysed using automated algorithms (GSSC, YASA, MAD), in order to obtain precise scoring of sleep stages, arousals and REM metrics. The Odds Ratio Product (ORP) was also used, in order to quantify arousal dynamics.

Results: Compared with good sleepers, both insomnia groups exhibited disrupted REM stability. They showed a greater frequency of REM arousals and awakenings, along with increased rapid eye movement activity and a higher proportion of phasic REM. The two insomnia subtypes were largely similar in terms of arousal rates; however, the duration of REM awakenings clearly separated them. CIN-AP had longer awakenings during REM, even though conventional PSG metrics did not differ. Multinomial models showed that CIN-AP was more likely to occur in older males

and was characterised by reduced overall REM duration but a larger proportion of REM sleep, together with more phasic REM and prolonged REM awakenings. The classification model reached an AUC of 0.752, and performance improved slightly once ORP and awakening duration were incorporated (AUC 0.755).

Conclusion: REM sleep behaviour offers a distinct signature for insomnia subtypes. The pattern of instability during REM separates patients with PSG-defined abnormalities from those whose recordings appear normal, and may explain the frequent mismatch between sleep complaints and objective findings. These REM-derived markers provide potential neurophysiological indicators of insomnia and could support more targeted diagnosis and treatment strategies.

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0422

RECENT OR LIFETIME STRESSOR EXPOSURE? ASSOCIATIONS WITH INSOMNIA SYMPTOM SEVERITY

Harrison Dickens¹, Veronica Floyd¹, Arash Assar², Mara Egeler², Emma Janes², Maddie Kaiser¹, Ellen Leen-Feldner¹, Ivan Vargas²

¹University of Arkansas, ²University of Notre Dame

Introduction: Insomnia is a highly prevalent disorder, impacting roughly 12% of the population. Recent stressor exposure has been implicated as a precipitating factor in the onset of insomnia. However, considering the importance of lifetime stressor exposure in other stress-related pathology, it is possible that lifetime stressor exposure drives insomnia, rather than recent stressor exposure. Lifetime stressor exposure may serve as predisposing factor, increasing risk of insomnia onset via enduring stress system changes. This study aimed to investigate the association between recent stressor exposure, lifetime stressor exposure, and insomnia symptoms severity.

Methods: Data was collected from 134 participants (55% female, Mage = 19.83, 28% Black/African American, 34% Latinx/Hispanic, and 39% White) completed a laboratory visit consisting of questionnaires. The Stress and Adversity Inventory (STRAIN) was used to assess lifetime and recent (past 3 months) stressor exposure and perceived stressor severity. Insomnia symptoms were measured using the Insomnia Severity Index (ISI). Race and sex were included as covariates in all models.

Results: We hypothesized that lifetime stressor exposure and perceived lifetime stressor severity but not recent stressor exposure or severity, would be associated with greater insomnia severity. Results from the regression model showed that recent stressor exposure was negatively associated with insomnia symptom severity ($b = -1.37$, $SE = 0.53$, $p = .01$). Recent stressor severity was associated with greater insomnia symptom severity ($b = 0.28$, $SE = 0.14$, $p = 0.04$). Neither lifetime stressor exposure nor perceived lifetime stressor severity was associated with insomnia symptom severity.

Conclusion: Results suggest a counterintuitive negative relation between recent stressor exposure on insomnia severity, where more recent stressors is associated with less severe insomnia symptoms. However, greater recent stressor severity was associated with greater insomnia symptom severity. These findings suggest that recent stressor severity may be a better predictor of insomnia risk than both recent or lifetime stressor exposure.

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0423

RISK FACTORS ASSOCIATED WITH DEVELOPMENT OF INSOMNIA DISORDER UP TO 12 MONTHS POSTPARTUM

Moe Takenoshita¹, Nan Guo¹, Pervez Sultan¹, Rachel Manber²

¹Stanford University, ²Department of Psychiatry and Behavioral Sciences, Stanford University

Introduction: Peripartum sleep disorders are linked to adverse maternal health outcomes and impaired infant bonding. Although higher incidences of sleep disorders have been reported during the peripartum period, risk factors for new postpartum sleep disorders remain under explored. We aimed to identify risk factors associated with new sleep disorders in the first year following childbirth.

Methods: We conducted a retrospective cohort analysis of a US commercial insurance claims database (MerativeTM MarketScan® Research Database). Women aged 18–55 with continuous insurance coverage from 90 days before estimated last menstrual period to 1 year after delivery were included. Exclusions were fetal demise, unknown delivery mode, and preexisting sleep disorders 3 months before delivery. Primary outcome was to identify demographic, medical, obstetric, and infant variables associated with new sleep disorder diagnoses between 1 and 12 months postpartum. Secondary outcomes included incidence of insomnia, sleep-related breathing disorders (SRBD) and sleep-related movement disorders (SRMD), and the monthly incidence of sleep disorders in the first year postpartum. Descriptive statistics were used and associations were assessed using univariate odds ratios and 95% confidence intervals (CIs), and multivariable logistic regression analysis was performed to identify independent predictors.

Results: 1,534,840 patients from 2007–2022 (vaginal delivery 68.5%; cesarean delivery: 31.6%) were included. Mean maternal age at delivery was 31.6 ± 4.6 years; mean gestational age 38.4 ± 2 weeks. Medical risk factors for new sleep disorders were major mental health disorder (adjusted odds ratios (aOR) 2.98, 95%CI [2.88, 3.09]), delivery BMI >40 (aOR 2.08, [1.95, 2.23]), substance use disorder (aOR 1.79 [1.65, 1.94]) and maternal age ≥ 35 (aOR 1.67 [1.29, 2.16]) ($p < 0.001$). Obstetric factors associated with sleep disorder diagnoses included pre-eclampsia (aOR 1.33 [1.26, 1.39]), severe maternal morbidity (aOR 1.25 [1.14, 1.37]), neglected maternal morbidity (aOR 1.22 [1.18, 1.26]), caesarean delivery (aOR 1.16 [1.12, 1.20]), and gestational age < 32 weeks (aOR 1.12 [1.07, 1.16]) ($p < 0.001$). Incidences of insomnia, SRBD, and SRMD were 0.77%, 0.12%, and 0.09%, respectively in the first year postpartum. Monthly incidences increased by 34% from months 1 to 6 postpartum (1,393 to 1,867 cases per month).

Conclusion: We identify clinical and obstetric risk factors for new postpartum sleep disorders. Screening these high-risk groups may facilitate timely referral and treatment.

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0424

SLEEP-RELATED IMPAIRMENT, DISTURBANCE, AND INSOMNIA AMONG CANNABIS CONSUMERS ACROSS TWO AGE-DISTINCT COHORTS IN SOUTH FLORIDA

Bria-Necole Diggs¹, Denise Vidot¹, Amrit Baral², Ciné Brown³, Girardin Jean-Louis¹

¹University of Miami, ²Johns Hopkins University, ³Sylvester Comprehensive Cancer Center

Introduction: Effects of cannabis use on sleep may differ by age, but age-stratified evidence remains limited. This study aimed to examine sleep-related impairment, sleep disturbance, and insomnia severity among cannabis consumers across two age-distinct cohorts in South Florida.

Methods: Data were harmonized from two ongoing cohorts: the Herbal Heart Study - Sleep Ancillary (HSS; N=150; young adults) and the Canna-ESSENTIAL Study (CE; N=60; middle-aged adults). Cannabis use patterns were ascertained using Sleep & Substance Use Questionnaire. Sleep health outcomes were assessed using the PROMIS Sleep-Related Impairment, PROMIS Sleep Disturbance, and the Insomnia Severity Index. All measures were self-reported. Chi-square tests, Fisher's Exact tests, and independent t-tests were conducted where appropriate.

Results: The analytic sample (N=210) included young-adults (mean age 25.6 years, SD=5.1) and middle-aged-adults (mean age: 42.6, SD=12.0); most participants were female (young-adults: 66.7% and middle-aged-adults: 78.3%). Racial/ethnic composition differed significantly, with young-adults primarily Hispanic/Latino (51.4%) and middle-aged-adults predominantly non-Hispanic Black (91.2%; $p < .0001$). Past-year cannabis use was more prevalent among young-adults than middle-aged-adults (66.7% vs. 43.4%; $p = 0.002$). Among cannabis consumers, middle-aged-adults more frequently used cannabis for sleep quality (84.6%) and duration (76.9%) compared with young-adults (64.0% and 55.0%; $p=0.04$). Middle-aged-adults reported significantly worse sleep outcomes, including higher PROMIS Sleep Disturbance scores (54.3 vs. 49.3; $p=0.0001$) and higher PROMIS Sleep-Related Impairment scores (56.0 vs. 51.2; $p=0.04$). Moderate and severe insomnia were more frequent in middle-aged-adults than young-adults (23.1% and 11.5% vs. 2.0% and 1.0%; $p<.0001$).

Conclusion: Findings highlight significant age-related differences in the relationship between cannabis and sleep health. Middle-aged cannabis consumers exhibited greater sleep disturbance, impairment, and insomnia severity than young adults, despite having lower prevalence of use overall and more likely to consume it specifically for sleep. Findings underscore the need for age-tailored interventions to specify cannabis use pattern (i.e. dose, route of administration) influence on this relationship, especially as interest in using cannabis for sleep continues to grow.

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0425

WHEN THE DAY STARTS WITH AN ACHE: MORNING HEADACHES AND SLEEP PATTERNS IN WOMEN WITH INSOMNIA AND PAIN COMPLAINTS

Marlee Richardson¹, Melanie Stearns¹, Ashley Curtis², Michael Robinson³, Roland Staud³, Jason Craggs¹, Mattina Davenport⁴, Pradeep Sahota⁵, Siva Chokkalingam⁵, Jasmine Berry⁶, Christina McCrae¹

¹University of South Florida, ²Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ³University of Florida, ⁴Nationwide Children's Hospital, The Ohio State University, ⁵University of Missouri, ⁶Mayo Clinic

Introduction: Chronic and episodic headaches have a strong bidirectional relationship with insomnia and poor sleep outcomes. AM (morning) headaches are common among chronic pain populations, but additional research is needed to understand their pain experiences and potentially inform targeted interventions. Herein, we investigated whether presence of AM headaches is associated with differences in diary-based sleep parameters and pain ratings in women with pain and sleep complaints. We hypothesize individuals with AM headaches will have more sleep disturbances and fatigue as well as greater pain intensity and unpleasantness.

Methods: Women (N=293, Mage=39.59, SD 12.65, 65% with morning headaches) reporting insomnia and pain complaints (65% also reporting morning headaches) were recruited in mid-Missouri for an RCT (R01NR017168, ClinicalTrials.gov Identifier: NCT03744156). During baseline assessment, participants completed 2 weeks of daily electronic diaries and reported AM headache presence (Y/N). Independent samples t-tests (SPSS) evaluated differences in sleep parameters and pain ratings in those with and without AM headaches. Participants reporting diagnosed sleep apnea were excluded.

Results: Morning fatigue was higher among individuals with AM headaches ($M=54.72 \pm 18.25$) than those without ($M=50.02 \pm 19.12$), $t(291)=-2.07$, $p=.04$. Pain intensity was greater in the AM headache group in the morning ($M=47.65 \pm 19.73$ vs. $M=42.52 \pm 21.91$), $t(291)=-2.04$, $p=.042$, and evening, ($M=49.62 \pm 19.10$ vs. $M=44.23 \pm 20.66$), $t(283)=-2.21$, $p=.028$. Evening pain unpleasantness was also rated as higher among those with AM headaches ($M=45.90 \pm 19.55$) compared to those without ($M=40.82 \pm 22.52$), $t(283)=-1.99$, $p=.048$, but morning pain unpleasantness ratings only trended towards significance.

Conclusion: AM headaches can present as a chronic condition or as a symptom of other sleep disorders. Individuals with AM headaches had minimal sleep differences overall, but morning fatigue, pain intensity (AM and PM), and evening pain unpleasantness ratings were all significantly greater in those with AM headaches. Undiagnosed sleep disorders other than insomnia (i.e., obstructive sleep apnea) or other health concerns, like increased intracranial pressure, may have contributed to pain-related findings. Considering the high prevalence of COMISA in chronic pain populations, further investigation should examine its impact on sleep and headache severity.

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0426

ALTERED NEURAL FEEDBACK PROCESSING AND IMPULSIVITY IN YOUTH WITH INSOMNIA

Shijie Yu¹, Xiao Li¹, Rachel Ngan Yin Chan², Joey Wing Yan Chan², Jihui Zhang³, Albert Martin Li³, Yun Kwok Wing², Ivana Rosenzweig⁴, Xiaoqing Hu¹, Shirley Xin Li⁵

¹The University of Hong Kong, ²Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong, ³Department of Paediatrics, Faculty of Medicine, The Chinese University of Hong Kong, ⁴Sleep and Brain Plasticity Centre, Department of Neuroimaging, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, UK, ⁵Department of Psychology, The University of Hong Kong, Hong Kong Special Administrative Region, Hong Kong

Introduction: Insomnia and sleep disturbance are linked to impulsive behavior and heightened risk-taking, particularly in youth. Prior EEG studies in individuals with insomnia have mainly examined response inhibition (e.g., reduced N2 in Go/No-go tasks), suggesting impaired motor inhibition but providing limited insight into neural mechanisms of risk evaluation and outcome processing. This study examined risk-taking and impulsivity in youths with insomnia versus healthy controls, integrating self-reported measures and a behavioral risk-taking task recorded with EEG.

Methods: Youth participants with DSM-5 insomnia disorder and ISI ≥ 9 ($N = 79$, mean age = 21.1 years, 75.7% female) and healthy sleeper controls ($N = 38$, mean age = 20.0 years, 71.1% female) were recruited. They completed the ISI, Barratt Impulsiveness Scale (BIS-11) and Short UPPS-P, and performed an automatic Balloon Analogue Risk Task (BART). EEG was recorded to extract FRN (240–310 ms) and P300 (320–450 ms) amplitudes to win and loss feedback. Group differences were examined using *t* tests and mixed-design ANOVAs.

Results: The Insomnia group scored significantly higher on ISI than controls ($p < .001$). Although there were no group differences in total BIS-11 or SUPPS-P scores, the Insomnia group showed higher Attentional Impulsivity ($p = .043$) and marginally higher Motor Impulsivity ($p = .050$). BART performance did not differ between groups. However, the Insomnia group showed significantly larger FRN amplitudes than controls for both win and loss feedback ($ps = .009$ and $.007$), indicating heightened early feedback sensitivity; P300 amplitudes did not differ between groups.

Conclusion: Despite comparable task-based behavioral performance, youths with insomnia exhibit elevated self-reported attentional impulsivity and enhanced early neural responses to feedback, suggesting heightened feedback sensitivity and attentional control rather than generalized behavioral disinhibition. Such changes in feedback processing may influence broader self-regulatory processes, including how feedback is used to guide subsequent behavior, even when overt risk taking is not apparent. Longitudinal studies are warranted to test the causal relationship and whether improving sleep may alter feedback related neural responses.

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0427

ALTERED BRAIN-STATE ENERGY LANDSCAPE AND NEUROTRANSMITTER CONTRIBUTIONS IN CHRONIC INSOMNIA: A NETWORK CONTROL THEORY STUDY

Qian Lu¹, Minyi Wang², Ying Jiang², Chuan He¹, Rihui Li²

¹Affiliated Jiangsu Shengze Hospital of Nanjing Medical University, ²University of Macau

Introduction: Chronic insomnia (CI) is characterized by hyperarousal and abnormal large-scale brain dynamics, yet the energetic demands underlying transitions between brain states remain poorly understood. Network control theory provides a mechanistic framework for quantifying the minimum control energy required for the brain to maintain or transition between functional configurations. This study aimed to characterize the energy landscape of brain states in patients with CI and to

examine its associations with symptom severity and neurotransmitter receptor architecture.

Methods: Forty-two adults with CI and forty-four matched healthy controls underwent diffusion tensor imaging, T1-weighted imaging, and resting-state functional MRI. Hidden Markov modeling identified recurrent functional states and quantified fractional occupancy and mean dwell time. Individual structural connectivity matrices served as system matrices for estimating control energy for state maintenance and transitions. Nineteen neurotransmitter receptor and transporter maps were incorporated to identify neurochemical contributors to altered energy patterns. Associations with insomnia severity and sleep quality were assessed.

Results: Two robust brain states were identified. State 1 was characterized by high activity in the default mode and frontoparietal control network, accompanied by reduced activation in the dorsal attention and somatomotor networks. State 2 was characterized by opposing patterns. CI participants showed significantly higher fractional occupancy ($Z = 2.84$, $P = 0.006$) and longer mean lifetime in State 1, alongside significantly reduced occupancy in State 2 ($Z = 3.72$, $P < 0.001$). The longer mean lifetime in State 1 was associated with lower habitual sleep efficiency ($R^2 = 0.10$, $P = 0.040$). The transition energy from State 2 to State 1 was positively associated with sleep latency ($R^2 = 0.14$, $P = 0.024$) and insomnia severity ($R^2 = 0.13$, $P = 0.028$). Neurotransmitter analyses revealed strong contributions from GABAergic, dopaminergic, cholinergic, glutamatergic, serotonergic, and opioid systems to altered transition energies.

Conclusion: CI is characterized by a flattened brain-state energy landscape, reduced dynamical stability, and neurotransmitter-mediated abnormalities in the energy required for transitioning between functional states. These findings provide mechanistic evidence linking impaired brain-state controllability with clinical symptoms and highlight neurotransmitter systems that may shape neural dynamics in insomnia.

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0428

TRAUMA-RELATED SELF-REPORTED AND OBJECTIVE SLEEP IN SOCIO- AND ECONOMICALLY MARGINALIZED ADULTS WITH INSOMNIA DISORDER ENROLLED IN A CLINICAL TRIAL

Caitlin Paquet¹, Carolina dos Santos², Lindsay Resca³, Michael Rueschman³, Susan Redline³, Suzanne Bertisch³

¹Brigham and Women's Hospital and Harvard Medical School,

²Brigham & Women's Sleep Medicine, ³Brigham and Women's Hospital

Introduction: Socioeconomic disadvantage may increase vulnerability to insomnia, possibly due to higher rates of trauma exposure. Comorbid posttraumatic stress disorder (PTSD) and insomnia has been linked to greater sleep impairment relative to insomnia alone. However, evidence comes mainly from Veterans and may not generalize to other trauma-exposed groups. In this study, we examined sleep diary and actigraphy data from socioeconomically marginalized adults enrolled in a comparative effectiveness trial. We hypothesized that those with comorbid PTSD and insomnia would exhibit higher sleep fragmentation than those with insomnia alone.

Methods: Adult participants with insomnia disorder completed validated surveys, as well as sleep diaries and actigraphy (GENE-Activ) for 7 days at baseline. PTSD symptom severity was assessed by the PTSD Symptom Checklist for Civilians (PCL-C). We defined PTSD as a PCL-C score of ≥ 44 . Diary and actigraphy-based metrics of nightly average of total sleep time (TST), sleep maintenance efficiency (SME), and wake after sleep onset (WASO) were compared by PTSD status in a subsample of 40 participants with ≥ 5 days of diary data and actigraphy.

Results: Participants were 77.2% female, mean age 47.7 years [range 19–83], 68.9% Non-White, and 15.7% had PTSD. Across the entire sample, actigraphy derived TST was 410.4 minutes (81.6), SME 82.9% (11.6), and WASO 95.0 minutes (53.6 minutes). Comorbid PTSD participants, relative to insomnia alone, reported lower actigraphy derived TST (-9.7 minutes, 95% CI: -82.2, 63.6), lower SME (estimate -5.3%, 95% CI: -15.4, 1.2), and longer WASO (estimate 15.1 minutes, 95% CI: -29.6, 48.7). Across the entire sample, sleep-diary derived TST was 398.9 minutes (67.0), SME 82.9% (11.1), and WASO 38.4 minutes (40.4 minutes). Comorbid PTSD participants, relative to insomnia alone, reported longer sleep diary derived TST (estimate 43.5 minutes, 95% CI: -13.6, 104.4), greater SME (estimate 3.0%, 95% CI: -5.6, 12.7), and less WASO (estimate -11.1 minutes, 95% CI: -40.0, 0.9).

Conclusion: Findings indicate that comorbid PTSD and insomnia are characterized by poorer actigraphy-derived sleep despite more favorable subjective reports relative to insomnia alone. Such discrepancies may reflect trauma-related heterogeneity within insomnia. Integrating subjective and objective measures in future work may help identify clinically relevant sleep phenotypes and guide tailored interventions.

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0429

HYPNOTIC USE DOES NOT INCREASE THE RISK OF INCIDENT MILD COGNITIVE IMPAIRMENT/DEMENTIA: A RETROSPECTIVE COHORT STUDY

Bhanu Kolla¹, Alessio Gugliotta¹, Meghna Mansukhani¹, Brandon Coombes¹, Diego Carvalho¹, Fabio Sambataro², Prashanti Vemuri¹

¹Mayo Clinic, ²University of Padua

Introduction: Observational studies have reported associations between hypnotic use and increased risk of cognitive decline. These findings may reflect confounding from insomnia severity, healthcare utilization, and comorbidity burden. We evaluated whether hypnotic exposure is independently associated with incident mild cognitive impairment (MCI) or dementia after rigorous adjustment, including a comprehensive propensity score (PS) and Apolipoprotein E (APOE) $\epsilon 4$ status.

Methods: We conducted a retrospective cohort study using a biobank sample with linked electronic health records and genetic data. Hypnotic exposure was derived from orders data and categorized as unexposed ($n=27,055$), single prescription ($n=4243$), shorter-term use ($n=3999$), long-term use (≥ 6 orders for ≥ 1 year; $n=3214$), and by drug class: benzodiazepines ($n=376$), Z-drugs ($n=6222$), trazodone ($n=2395$), and mixed exposure (≥ 2 classes; $n=2435$). Incident MCI/dementia diagnoses (ICD-9/10) occurring ≥ 12 months after initial prescription constituted outcomes. The

PS modeled likelihood of receiving hypnotics based on demographics; sleep-related conditions; healthcare utilization (record length, visit frequency, diagnostic burden); psychiatric comorbidities; alcohol use and chronic pain. Hypnotic users were 1:2 matched to unexposed individuals on age, sex, healthcare utilization, and PS. Cox proportional hazards models with a 60-month lag tested associations of exposure category, duration, and class with outcomes. Models adjusted for all PS covariates, cardiovascular risk score, and APOE $\epsilon 4$ status.

Results: Matched but unadjusted analyses suggested slightly higher hazards of MCI/dementia among hypnotic users versus unexposed (HR=1.08; CI=0.99–1.18). However, after PS adjustment and APOE $\epsilon 4$ inclusion, hypnotic users showed significantly lower hazards (HR=0.81; CI=0.74–0.89). Class-specific analyses indicated reduced hazards for Z-drugs (HR=0.83; CI=0.74–0.93), trazodone (HR=0.71; CI=0.60–0.86), and mixed users (HR=0.79; CI=0.68–0.91), with all classes showing lower hazards than benzodiazepine-only users. Long-term hypnotic use was associated with lower hazards than no prescription (HR=0.69; CI=0.61–0.80), single prescription (HR=0.81; CI=0.68–0.97), or short-term use (HR=0.76; CI=0.65–0.90).

Conclusion: The elevated cognitive risk among hypnotic users appears largely attributable to underlying clinical/utilization factors rather than hypnotic exposure itself. After comprehensive confounding control, all hypnotic classes except benzodiazepines demonstrated lower risk of MCI/dementia. These findings underscore the need for rigorous adjustment in studies of insomnia pharmacotherapy and suggest potential protective effects of certain hypnotics that warrant further investigation.

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0430

PERIOPERATIVE SLEEP OPTIMIZATION: EFFECTS ON NEUROCOGNITIVE RECOVERY AND SURGICAL OUTCOMES IN OLDER ADULTS (SLEEP-BOOST TRIAL)

Anaëlle Charles¹, Andrea Castillo Suárez², Mili Jimenez Gallardo², Karoline Sanchez², Mansi Chhajed², Peng Li², Kun Hu², John Winkelman³, Michael Smith⁴, Lei Gao²

¹Perioperative Sleep and Brain Lab (PSBL), Medical Biodynamics Center, Massachusetts General Hospital, ²Massachusetts General Hospital and Harvard Medical School, ³Harvard Medical School, ⁴Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine

Introduction: Insomnia affects up to one-third of older adults undergoing knee/hip replacement surgery and yet it remains undertreated in perioperative care. Cognitive Behavioral Therapy for Insomnia (CBT-I) has rarely been attempted in this population due to unpredictable timing and resource-limitations before and/or after surgery. This pilot study examined whether an abbreviated CBT-I protocol improves insomnia symptoms and surgical outcomes in older patients.

Methods: SLEEP-BOOST is an NIH-funded single-site randomized pilot trial (R03AG087439; NCT06052397) at MGH. Since Jan 2025, 18 (target: 50 by 2026) knee/hip replacement patients (age ≥ 65) with insomnia (ISI ≥ 10) completed our study up until 1 month post-surgery having been randomized 1:1 to a CBT-I or Sleep-Hygiene Education group (SHE; matched patient contact control), three weeks before surgery with a booster session 2-3 weeks after. ISI, general sleep quality (PSQI), pain, and cognitive performance

(Montreal Cognitive Assessment; MoCA) were assessed at baseline and 1-month. Paired t-tests evaluated within-group ISI changes (Δ ISI [95% CI], Cohen's d [d]), and linear mixed-effects models tested whether ISI influenced postoperative outcomes, adjusting for age and sex.

Results: The CBT-I group, showed progressive and large improvement in insomnia severity through to 1-month after surgery (Δ ISI = -4.3; $p = 0.01$; $d = 1.2$); the SHE group showed preoperative improvements that were not fully sustained (Δ ISI = -0.13; $p = 0.93$; $d = 0.03$). Between-group comparison: CBT-I group vs. SHE (Δ ISI: -4.25 vs. -0.13; $p = 0.04$). Within-group comparisons showed that CBT-I was associated with improved global sleep quality (Δ PSQI [Baseline vs. 1-month] = -1.29; $p = 0.004$; $d = 1.7$) and cognitive performance (Δ MoCA = 1.7; $p = 0.04$; $d = 0.8$), whereas the control group showed no postoperative changes for sleep quality and cognitive performance ($ps > .05$). The LME models showed no change in pain over time in either group.

Conclusion: Our results showed that the abbreviated perioperative CBT-I intervention was feasible and associated with reduced insomnia symptoms, improving sleep quality, and postoperative cognitive recovery in older surgical patients. Full trial results with 3-month follow-up will strengthen our preliminary findings and determine whether CBT-I provides more durable postoperative benefits than control in older surgical patients.

Support (if any):

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0431

SLEEP AID USAGE FOLLOWING BENZODIAZEPINE RECEPTOR AGONIST TAPERING AND COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IN MIDDLE-AGED AND OLDER ADULTS

Sara Ghadimi¹, Alexander Erickson², Mia Vaughan³, Michael Mitchell⁴, Karen Josephson⁵, M. Safwan Badr⁶, Jennifer Martin⁷, Michelle Zeidler⁸, Cathy Alessi⁴, Constance Fung⁴

¹University of California Davis School of Medicine, ²National Sleep Foundation, ³UT Austin, ⁴Geriatric Research, Education and Clinical Center, VA Greater Los Angeles Healthcare System, ⁵VA Greater Los Angeles GRECC, ⁶Wayne State University, ⁷VA Miami Healthcare System, Geriatric Research, Education and Clinical Center, ⁸Department of Medicine, David Geffen School of Medicine, University of California Los Angeles

Introduction: A combination of medication tapering and cognitive behavioral therapy for insomnia (CBTI) improves benzodiazepine receptor agonists (BZRA) deprescribing success. However, discontinuing BZRAs may leave patients feeling like they need to use other non-BZRA sleep aids (e.g., melatonin). We aimed to describe temporal patterns of use of sleep aids from baseline to 6-month follow-up (6FU) associated with interventions that combined CBTI with BZRA tapering and to assess the odds of BZRA use at 6FU associated with non-BZRA use at baseline.

Methods: We analyzed diary data from a randomized trial (NCT03687086) that compared CBTI combined with a masked BZRA taper method (MTcap) versus standard open BZRA taper (SGT) to identify the frequency of four temporal patterns of sleep aids at 6FU relative to baseline: 1) "less BZRA-nonBZRA", 2) "stable BZRA-nonBZRA", 3) "more BZRA-nonBZRA", and 4) "less BZRA/-more nonBZRA." We also assessed use of specific non-BZAs (e.g., melatonin) and whether non-BZRAs use at baseline predicted patterns of sleep aid usage at 6FU.

Results: Among 139 participants (71 MTcap; 68 SGT; mean age 69 years), 63% of participants were in the "less" category (68% MTcap, 59% SGT), 26% "stable" category (20% MTcap, 32% SGT), 5% "more" category (6% MTcap, 4% SGT), and 6% "less BZRA/more nonBZRA" category (7% MTcap, 4% SGT) at 6FU. Compared to BZRA only at baseline, combination BZRA-nonBZRA use at baseline had an increased odds of only nonBZRA use ($OR = 9.05$) and decreased odds of only BZRA ($OR = .23$) or no BZRA/nonBZRA ($OR = .38$) at 6FU.

Conclusion: The MTcap and SGT BZRA tapering programs, which both included CBTI, resulted in less use of sleeping aids overall. BZRA deprescribing programs that include CBTI are effective in reducing sleep aid use in middle-aged and older adults.

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0432

BASELINE INSOMNIA SEVERITY PREDICTS MAGNITUDE OF RESPONSE TO DIGITAL COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA: GREATER IMPROVEMENTS IN SEVERE CASES

Shimin Ooi¹, Michael Xia²

¹Princeton University, ²Duke University

Introduction: Identifying baseline predictors of treatment response is essential for patient stratification and clinical expectation management in insomnia interventions. While evidence indicates that severe insomnia may demonstrate reduced response to behavioral treatments, research examining digital therapeutic platforms remains limited. This study evaluated whether baseline insomnia severity, quantified by sleep efficiency, predicts treatment response to digital cognitive behavioral therapy for insomnia (dCBT-I).

Methods: Adults (N=528) completed an 8-week digital CBT-I program with baseline and post-intervention sleep diaries. Participants were stratified by baseline sleep efficiency: Severe (< 70%, n=108), Moderate (70-84%, n=197), and Mild ($\geq 85\%$, n=212). Primary outcomes were absolute and relative changes in sleep efficiency. Secondary outcomes included total sleep time, sleep onset latency, and awakenings. Linear regression examined baseline sleep efficiency as a predictor of treatment response, controlling for age and gender.

Results: Baseline severity strongly predicted treatment response magnitude. Severe insomnia participants showed the largest improvements: sleep efficiency increased from $55.0 \pm 11.2\%$ to $79.2 \pm 13.8\%$ (absolute change +24.2 percentage points, relative improvement +44.0%, $p < 0.001$, Cohen's $d=1.52$). Moderate insomnia participants improved from $78.7 \pm 4.1\%$ to $86.8 \pm 10.5\%$ (+8.1 percentage points, +10.3%, $p < 0.001$, $d=0.51$). Mild insomnia participants showed minimal change from $90.1 \pm 4.2\%$ to $91.2 \pm 7.8\%$ (+1.1 percentage points, +1.2%, $p < 0.05$, $d=0.09$). Linear regression confirmed baseline sleep efficiency as a significant predictor of absolute improvement ($\beta = -0.48$, $p < 0.001$), with each 10-point lower baseline sleep efficiency predicting an additional 4.8 percentage points improvement. Despite starting with lower sleep efficiency, severe insomnia participants reached clinically meaningful levels (79.2%) by week 8.

Conclusion: Digital CBT-I demonstrates greatest efficacy in individuals with severe baseline insomnia, with effect sizes ($d=1.52$)

exceeding those typically reported for behavioral interventions. These findings challenge concerns about treatment effectiveness in severe cases and suggest digital CBT-I should be prioritized for patients with marked sleep disturbance where potential for meaningful improvement is greatest. The strong dose-response relationship between baseline severity and treatment response provides evidence-based expectations for outcomes.

Support (if any):

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0433

AN AUDITORY NEUROMODULATION-BASED PRESCRIPTION DIGITAL THERAPEUTIC FOR INSOMNIA DISORDER: PHASE 3 TRIAL PROTOCOL (SERENE)

Kyunghee Kim¹, Jonghwa Park¹, H.Y.E.O.N.J.O.O.N.G. KIM¹, Jiyeon Ha¹, Jung-Ick Byun², Kyoung Jin Hwang³, Hyeyun Kim⁴, Jung-won Shin⁵, Jun-Sang Sunwoo⁶, Ki-Young Jung⁷

¹Bell Therapeutics, ²Kyung Hee University Hospital at Gangdong,

³Kyung Hee University Medical Center, ⁴International St. Mary's Hospital, Catholic Kwandong University College of Medicine,

⁵CHA Bundang Medical Center, CHA University, ⁶Kangbuk Samsung Hospital, ⁷Seoul National University College of Medicine

Introduction: Insomnia affects 10-15% of adults worldwide. While pharmacotherapy offers rapid symptom relief, concerns about dependence limit its use. Prescription digital therapeutics (PDTs) have emerged as scalable alternatives, yet existing PDTs largely replicate CBT-I principles and face similar adherence challenges inherent to behavioral interventions requiring sustained patient engagement. BELL-001 represents the first PDTs designed to translate the mechanism of hypnotics rather than behavioral modification. Using auditory stimulation, BELL-001 induces acute autonomic downregulation within the first 30 minutes of use, targeting hyperarousal through real-time biosignal capturing and dynamic acoustic feedback. This pharmacomimetic approach enables immediate effects without multi-week behavioral conditioning. The SERENE trial (Sleep Efficacy Randomized Evaluation of a digital thErapeutic for iNsomnia) was designed to rigorously evaluate the short-term efficacy and safety of BELL-001 in adults with insomnia.

Methods: SERENE is a multicenter, prospective, randomized, double-blind, sham-controlled, superiority trial. A minimum of 114 participants aged 19-75 years diagnosed with insomnia according to ICD-11 criteria and with an Insomnia Severity Index (ISI) score ≥ 15 will be enrolled from six medical centers in the Republic of Korea. Eligible participants will be randomized 1:1 to the BELL-001 or sham group. The primary endpoint is the change in ISI score from baseline to 4 weeks. Secondary endpoints include proportion of clinical responders (≥ 6 -point ISI reduction), subjective sleep onset latency and wake after sleep onset from sleep diaries, and validated questionnaires assessing sleepiness, fatigue, depression, anxiety, quality of life, and work productivity. Treatment-emergent adverse events will be evaluated for safety analysis.

Results: The trial has received Korean Ministry of Food and Drug Safety (MFDS; K-FDA) approval in the Republic of Korea.

Conclusion: SERENE trial is the first Phase 3 evaluation of a pharmacomimetic prescription digital therapeutic designed to translate hypnotics mechanism. This study will provide evidence on whether BELL-001 can establish a neuromodulation-based PDTs delivering rapid efficacy with a favorable safety profile, offering clinicians a safe and effective treatment option for patients with insomnia disorder.

Support (if any): BELL Therapeutics Inc.

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0434

BRIEF DYADIC SLEEP INTERVENTIONS FOR COUPLES COPING WITH CANCER: FEASIBILITY AND ACCEPTABILITY

Youngmee Kim¹, Alberto Ramos², Jennifer Steel³, Wendy Troxel⁴, William Wohlgenuth⁵, Thomas Tsai¹

¹University of Miami, ²University of Miami School of Medicine,

³University of Pittsburgh, ⁴RAND Corporation, ⁵Miami VA

Introduction: Adults with cancer and their family caregivers are highly vulnerable to sleep problems and their associated health consequences. Because about 65% of adults, including patients with cancer, share a bed with a partner, and because bedpartners influence each other's sleep, dyadic sleep interventions are particularly relevant for couples coping with cancer. However, existing psychobehavioral sleep interventions rarely address both members' sleep simultaneously. This study examines the feasibility and acceptability of two brief dyadic sleep interventions: My Sleep Our Sleep (MSOS) and Brief Behavioral Treatment for Insomnia for Couples with Cancer (BBTI-CC) (NCT06569693).

Methods: Patient-caregiver dyads are randomly assigned to either intervention condition. Both programs are delivered synchronously via Zoom in four weekly sessions. Questionnaire, daily sleep logs, and actigraphy-based sleep data are collected before the intervention (T1), one week (T2) and eight weeks (T3) post-intervention. Participant satisfaction with each session is assessed immediately after each of the four sessions.

Results: Over 13 months, we enrolled 33 dyads (84.6% enrollment rate; 43.4% of target). Common ineligibility reasons included not sharing a bed (41.6%), absence of sleep problems (10.8%), and patient death (9.1%). Twenty-nine dyads (87.9%) completed the intervention: three dyads withdrew before session 1, and one withdrew after session 1 due to patient death. All remaining participants completed T2 and T3, except one individual at T2. Participants reported high satisfaction with the intervention sessions ($m = 4.69$, range 4.59 – 4.86 on a 5-point scale). Satisfaction did not differ by intervention conditions ($p \geq .711$) or patient vs caregiver status ($p \geq .277$), with one exception: in the MSOS condition, caregivers reported greater motivation to change their maladaptive sleep-related cognitions than patients ($p = .012$).

Conclusion: Preliminary findings indicate that brief sleep interventions for both adults with cancer and their caregivers are feasible and acceptable. As enrollment continues, we will evaluate whether both MSOS and BBTI-CC produce similar improvements in sleep disturbance, insomnia severity, and health-related quality of life. Results will inform refinement of intervention content and procedures for a future full-scale trial targeting adult patients with cancer and their bedpartner caregivers.

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0435

FEASIBILITY OF DOSE-VARIED CBT-I, ASSOCIATED SLEEP CONTINUITY TRAJECTORIES, & ADHERENCE IN BREAST CANCER SURVIVORS

Alexandria Muench¹, Knashawn Morales², Mark Seewald², Sheila Garland³, Donn Posner⁴, Kara Buda¹, Rebecca Boswell¹, Michael Perlis²

¹Penn Medicine Princeton Health, ²University of Pennsylvania, ³Memorial University of Newfoundland, ⁴Sleepwell Consultants and Stanford University

Introduction: Insomnia is a common and persistent concern among breast cancer survivors, often continuing well beyond active treatment. Although Cognitive Behavioral Therapy for Insomnia (CBT-I) improves sleep continuity, the optimal dose of the intervention in oncology settings remain unclear. This study assessed the feasibility of a multi-dose CBT-I protocol and examined trajectories of sleep continuity, and adherence over the course of treatment.

Methods: Breast cancer survivors aged 25–85 (n=28; 78.6% White), within 6 years of completing treatment, were enrolled. Eligible participants endorsing clinically significant insomnia and fatigue (85.7% insomnia+fatigue) were randomized to one of four CBT-I dose groups (4, 8, 10, or 12 sessions). All treatment was delivered weekly via HIPAA-compliant telehealth by a CBT-I clinician. Primary outcomes included feasibility metrics: recruitment [goal, n=60] & retention (enrolled through final session) and adherence (deviation [minutes] between prescribed & actual time-in-bed and stimulus-control schedules). Exploratory outcomes included diary-derived sleep latency (SL), wake after sleep onset (WASO), and early morning awakenings (EMA). Group differences in sleep continuity over time were evaluated with a GEE model. Secondary models tested group differences in adherence.

Results: Recruitment goals were successfully achieved, with 61 participants enrolled. With respect to retention, approximately half of the subjects were subsequently disenrolled due to factors such as cancer recurrence, psychosocial stressors, loss to follow-up, and the discovery of medical comorbidities (e.g., newly identified sleep apnea). Of the remaining participants, 35 initiated the study protocol, and 28 ultimately completed the trial. With respect to sleep continuity, GEE models demonstrated significant time effects, with reductions in SL, WASO and EMA across all groups (all $\beta_{\text{time}} < 0$, $p < .001$). Finally, with respect to adherence, dose did not moderate differences in groups, indicating parallel trajectories across randomized groups (all interaction $p > .10$).

Conclusion: A multi-dose CBT-I protocol is feasible for breast cancer survivors. Preliminary results suggest that across all groups, participants showed statistically significant improvements in sleep continuity over time (i.e., they fell asleep faster, spent less time awake during the night, and had fewer early awakenings). However there is no effect of CBT-I dosage on adherence. Analyses are ongoing.

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0436

IS BRIGHT LIGHT MORE EFFECTIVE THAN DIM LIGHT IN IMPROVING SLEEP AMONG INDIVIDUALS WITH CANCER? A META-ANALYSIS

Horng-Shiuann Wu¹, Meghana Atmakur², Jessica Sender³, Meng-Hua Tao⁴, Jiyong Ling¹

¹Michigan State University College of Nursing, ²Michigan State University Lyman Briggs College, ³Michigan State University Library, ⁴Henry Ford Health Department of Public Health Sciences

Introduction: Disrupted sleep is common in cancer patients due to dysregulated circadian rhythm. Studies reported that bright light therapy (BLT) improves insomnia in cancer patients. However, dim light controls have also been shown to improve insomnia symptoms, contradicting the current belief that bright light is superior to dim light. This meta-analysis examined the effects of BLT on sleep in adult cancer populations and explored potential moderators including individual and BLT-related characteristics.

Methods: A comprehensive search (updated in October 2025) was performed in PubMed, CINAHL (EBSCO), Embase, and Web of Science Core Collection. Meta analyses were conducted using the Comprehensive Meta-Analysis Software version 4. Random effect models assessed pooled effect sizes. Cochran's Q test and I² statistics evaluated study heterogeneity. Overall sleep quality was measured by Pittsburgh Sleep Quality Index global scores.

Results: The searches identified a total of 1,721 citations. Ten randomized controlled trials were included in this meta-analysis. BLT was moderately effective in improving patient-reported sleep quality ($g=0.49$; 95% CI: 0.04, 0.95; $p=.034$). Intensity of dim light control ($Q=13.07$, $p=.023$) and duration of BLT ($Q=13.11$, $p=.022$) were significantly associated with intervention effects. The greatest effects were observed in studies with dim light control of < 50 lux ($g=1.03$; 95% CI: 0.06, 2.00) and therapy duration of 1 week ($g=0.89$; 95% CI: 0.03, 1.75). BLT had small effects on decreasing actigraphy- or polysomnography- measured sleep onset latency ($g=0.39$; 95% CI: 0.05, 0.74) and increasing sleep duration ($g=0.31$; 95% CI: -0.05, 0.66). Noticeably larger effects were reported in studies included both males and females than females only ($g=0.61$ vs. 0.37, $p=.610$), mixed cancer types than breast cancer only ($g=0.69$ vs. 0.22, $p=.337$), and more non-White than White-dominated participants ($g=0.46$ vs. 0.25, $p=.684$). The findings were favorable to dim light for patient-reported sleep onset latency ($g=-0.52$; 95% CI: -1.27, 0.24).

Conclusion: This meta-analysis supports that BLT is superior to dim light in improving patient-reported sleep quality and objectively measured sleep onset latency. BLT may be beneficial to patients across different cancer types and treatment status. Shorter therapy durations, and potential sex- and race-differences in the BLT effects demand further investigation.

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0437

PERIOPERATIVE CBT-I FOR OLDER SURGICAL PATIENTS: FEASIBILITY AND ENGAGEMENT RESULTS FROM THE SLEEP-BOOST TRIALAndrea Castillo Suárez¹, Mili Jimenez Gallardo¹, Karoline Sanchez¹, Mansi Chhajed¹, Anaëlle Charles², Peng Li¹, Kun Hu¹, Michael Smith³, John Winkelman⁴, Lei Gao¹¹Massachusetts General Hospital/Harvard Medical School,²Perioperative Sleep and Brain Lab (PSBL), Medical Biodynamics Center, Massachusetts General Hospital, Boston, MA,³Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, ⁴Harvard Medical School

Introduction: Insomnia affects up to one-third of older adults undergoing elective joint replacement and is linked to poorer postoperative recovery, yet it remains largely unaddressed in perioperative care. Sleep interventions, including Cognitive Behavioral Therapy for Insomnia (CBT-I), have rarely been attempted in this population due to unpredictable timing and resource-limitations before and/or after surgery. We tested the feasibility of a condensed CBT-I intervention in older surgical patients with insomnia.

Methods: SLEEP-BOOST is an NIH-funded single-site randomized pilot trial (R03AG087439; NCT06052397) at MGH. Since Jan 2025, 27 (target: 50 by end of 2026) knee/hip replacement patients (age $\geq$ 65) with Insomnia Severity Index $\geq$ 10 have been randomized 1:1 to the CBT-I group (three virtual sessions plus CBT-I Coach app) or sleep-hygiene education with matched contact control over Weeks 1-3 pre-op and post-op. Feasibility was assessed by the completion of daily sleep diary days (pre-/post-op) and an Adherence Form developed by the Veterans Affairs CBT-I Training Program (Week 2 & 3). Treatment-arm adherence items included practicing CBT-I components and app use; control-arm focused on sleep-hygiene tips. Adherence scores were calculated as the sum of item ratings (1-5 Likert scale). Participants were also asked to wear an actigraphy watch throughout the study ($\geq$ 7 days pre-/post-op). Participants who dropped out were excluded (treatment n=9; control n=12).

Results: Daily sleep-diary completion in the treatment-arm was 97% $\pm$ 15.2 of assigned diaries, and the control-arm achieved 93% $\pm$ 14.9. Actigraphy data ($\geq$ 7 days) were obtained from 95% participants pre-op and 83% post-op. All participants in the treatment-arm (100%) reported engaging with CBT-I components and 80% reported app use throughout the intervention. Participants in the treatment-arm spent 0.94 hours during Week 2, and 1.20 hours during Week 3 on the CBT-I Coach app and intervention practices. Adherence questionnaire scores were initially lower in the treatment arm at Week 2 (16.8 $\pm$ 5.04 vs. 24.7 $\pm$ 6.04; p=0.004) but improved significantly to be similar by Week 3 (20.0 $\pm$ 3.91 vs. 24.4 $\pm$ 6.14; p>0.05).

Conclusion: Our findings suggest that perioperative CBT-I is feasible in older adults preparing for joint replacement, with excellent adherence to both daily diaries and intervention components. Whether this level of engagement improves insomnia symptoms and postoperative recovery remains to be seen.

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0438

DIGITAL NEUROMODULATION TARGETING HYPERAROUSAL IN INSOMNIA: NEUROPHYSIOLOGICAL MECHANISMS OF SELF-REGULATED AUDITORY BIOFEEDBACKHyeonjoong Kim¹, Hyunsub Kim², Jonghwa Park¹, Jiyeon Ha¹, Jung Bin Kim³, Yoonseob Lim⁴, Ki-Young Jung⁵, Chang-Hwan Lim²¹Bell Therapeutics, ²Hanyang University, ³Korea University,⁴KIST, ⁵Seoul National University College of Medicine

Introduction: Self-Regulated Auditory Biofeedback (SAB) represents a novel app-based digital therapeutic for insomnia that uses real-time physiological monitoring to deliver personalized acoustic stimulation targeting hyperarousal. Preliminary clinical studies have demonstrated rapid therapeutic benefits, with patients experiencing improved sleep onset and quality within days. However, the neurophysiological mechanism of action underlying these clinical improvements remains incompletely characterized. This study addresses this knowledge gap through comprehensive multimodal investigation of how closed-loop auditory neuromodulation modulates autonomic, cortical, and interoceptive systems in individuals with chronic insomnia.

Methods: Eighty adults with chronic insomnia were randomized to receive either SAB(pipeline code: BELL001) or sham stimulation during a single 70-minute laboratory session comprising resting baseline, conscious biofeedback, and subconscious biofeedback phases. The SAB system continuously captured cardiac, respiratory, and neural signals, dynamically optimizing acoustic parameters in real-time based on individual physiological states. Sham condition delivered non-contingent audio without closed-loop adaptation. Continuous high-density EEG, heart rate variability (HRV) metrics, respiration, and electromyography were recorded throughout. Interoceptive accuracy was assessed at baseline. Autonomic stability, cortical arousal patterns, and interoceptive moderation effects were analyzed across intervention phases.

Results: Compared with sham, SAB produced greater autonomic stability and reductions in cortical arousal markers. EEG analyses revealed decreased frontal high-frequency activity and increased posterior alpha power, indicating transition toward sleep-permissive states. Individuals with higher baseline interoceptive sensitivity showed substantially larger treatment responses during SAB, but not during sham stimulation.

Conclusion: This study provides the first comprehensive neurophysiological characterization of SAB, demonstrating that real-time auditory neuromodulation produces immediate, measurable reductions in hyperarousal through coordinated downregulation of autonomic and cortical arousal systems. The capacity to induce acute neurophysiological changes via non-invasive digital stimulation represents a paradigm shift in insomnia treatment, offering scalable, accessible intervention without pharmacological risks or therapist dependency. Interoceptive sensitivity showed an associative pattern with treatment response, warranting further investigation before being considered for biomarker-based personalization. These mechanistic insights establish the scientific foundation for app-based digital therapeutics in sleep medicine and demonstrate that neuromodulation can be rigorously validated using objective neurophysiological endpoints, advancing the field toward evidence-based precision digital medicine.

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0439

OFFERING IMMEDIATE DIGITAL CBT-I AT FIRST CONTACT TRIPLES TREATMENT ADOPTION COMPARED WITH TRADITIONAL REFERRAL-DEPENDENT PATHWAYS

Vikas Jain, Jeremy John, Kayden Amador

Dream Center for Sleep & Circadian Sciences

Introduction: Cognitive Behavioral Therapy for Insomnia (CBT-I) is the first-line treatment for chronic insomnia, yet real-world adoption remains low, with only 10–20% of referred patients initiating therapy. Common barriers include long wait times, multi-step referral processes, and limited access to behavioral sleep clinicians. To reduce these structural obstacles, our sleep center implemented an Immediate Digital CBT-I Access model, offering same-day enrollment in an evidence-based digital CBT-I program at the time of first patient contact. This study evaluated treatment adoption under this rapid-access approach.

Methods: We retrospectively reviewed consecutive adults who contacted a sleep center with insomnia as their primary complaint (N=50). All callers were offered immediate enrollment into a structured, clinician-supported digital CBT-I platform during the initial interaction, without requiring a prior sleep medicine consultation. Adoption was defined as completing intake and initiating the digital program. Patients who declined, cancelled, or did not engage were classified as non-adopters. All data were de-identified.

Results: Of 50 adult callers, 29 (58%) accepted immediate access and initiated digital CBT-I, while 21 (42%) declined or did not proceed. Adoption rates in this immediate-access model were approximately 3–5 times higher than the 10–20% uptake typically reported in referral-based pathways. Among adopters, treatment commonly began within 0–7 days of first contact, effectively removing the multi-week delay inherent to traditional consult-before-referral workflows.

Conclusion: Providing immediate digital CBT-I at first contact yielded a 58% adoption rate, substantially exceeding real-world uptake under standard referral systems. These results suggest that structural barriers—rather than patient resistance—are the primary drivers of low CBT-I utilization. A rapid-access, digital-first model may offer a scalable strategy to expand delivery of evidence-based insomnia care. Future analyses will evaluate treatment outcomes, patient satisfaction, and cost-effectiveness as additional participants complete the program.

Support (if any):

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0440

REAL WORLD EVIDENCE OF NON-INVASIVE VESTIBULAR NERVE STIMULATION FOR INSOMNIA

Alexis Foroozan¹, Asim Roy², Kunal Agarwal³, Jason McKeown¹¹Neurovalens Ltd., ²Ohio Sleep Medicine Institute, ³Tidal Health

Introduction: Modius Sleep is an FDA-cleared, noninvasive vestibular nerve stimulation device prescribed as a nonpharmacologic option for adults with insomnia. Real-world data are limited on prescribing patterns, integration into routine care, and patient progression through initiation, activation, and

continuation, particularly among individuals with complex comorbidities. This post-market clinical follow-up quantifies organic adoption, comorbidity burden, implementation metrics across the fulfillment and retention pathway, and early descriptive Insomnia Severity Index outcomes. Exploratory analyses will examine related care behaviors, including PAP use and sleep-medication patterns, as additional data accrue.

Methods: Interim data were analyzed from a prospective, multi-center observational follow-up reviewing prescriptions recorded between March 12 and December 1, 2025. Demographics, comorbidities, and baseline characteristics were captured at prescription. Order status documented the implementation pathway (prescription, device shipped, retained). ISI scores were collected at baseline and, when available, at 4 and 8 weeks. Change in ISI was analyzed using paired t-tests (available-case analysis) and responders were defined as ≥ 6 -point improvement from baseline. Subjective surveys assessed self-reported usage frequency, summarized by unique users.

Results: Data from 135 prescriptions (mean age 58.9 ± 13.4 years; 60% female) from 32 prescribers were collected. Comorbidity data (n = 95) showed 23% with ≥ 3 conditions; OSA, hypertension, anxiety, and depression were most common. Eighty-four devices were shipped (49 retained, 35 returned); 51 prescriptions remained incomplete. Among retained patients, 31 individuals reported device use; 55% of respondents reported daily use and 37% reported use ≥ 3 days/week. Baseline ISI for the full cohort (n=135) was 20.9 ± 5.3 . In paired 4-week completers (n=26), ISI decreased from 20.7 ± 4.8 to 18.3 ± 4.2 (-2.4 ; $p=0.012$; 27% responders). In 8-week completers (n=18), ISI improved from 21.5 ± 5.7 to 15.4 ± 6.1 (-6.1 ; $p < 0.0001$; 50% responders). No serious device-related adverse events were reported.

Conclusion: This data provides descriptive real-world insight into clinician adoption of vestibular nerve stimulation for insomnia, patient complexity, and progression through fulfillment and retention. Implementation patterns and initial ISI improvements help inform priorities for future evaluation, including health-economic impact, reimbursement considerations, and controlled clinical studies to further define the role of vestibular nerve stimulation as a nonpharmacologic treatment option for insomnia.

Support (if any):

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0441

REAL-WORLD HEALTHCARE COST REDUCTIONS FOLLOWING DIGITAL CBT-I FOR INSOMNIA: A MATCHED-CONTROL US CLAIMS STUDY

Christopher Miller, Danielle Bradley, Shana Hall

Big Health

Introduction: Insomnia affects one-third of US adults and carries substantial economic burden. Despite guideline recommendations for cognitive behavioral therapy for insomnia (CBT-I) as first-line treatment, access is constrained by shortage of trained clinicians. Fully automated digital CBT-I offers a scalable alternative with potential to reduce population-level healthcare costs, yet large-scale US economic evidence remains limited.

Methods: Retrospective cohort study comparing healthcare costs (2013–2023) for 11,027 adults initiating SleepioRx versus 10,770 matched controls receiving standard insomnia care. Participants matched 1:1 on age, sex, insurance type, geography, baseline

comorbidities, and index year. Primary outcome: difference-in-differences in total annual healthcare costs (medical + pharmacy) for 12 months pre-initiation and post-initiation. Analyses used ordinary least squares regression with sensitivity adjustments for baseline utilization and comorbidities. Costs standardized to 2023 US dollars.

Results: Final sample: 21,797 adults (mean age 44 years; 66% female). Patients initiating digital CBT-I demonstrated substantially greater cost reductions than matched controls over one year. Mean savings: \$2,083 per person annually (95% CI \$1,443-\$2,722; $P < .001$), representing 40% reduction in total costs relative to usual care. Pharmacy costs drove the majority of savings (\$1,745 per person-year; 46% reduction), with smaller favorable changes in medical service costs.

Conclusion: In a large real-world US claims analysis, digital CBT-I initiation was associated with marked healthcare cost reductions compared with standard insomnia management. These findings support scaling digital CBT-I within commercial and Medicare populations as a high-value strategy for addressing both clinical need and economic burden of insomnia.

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0442

REAL-WORLD SUSTAINABILITY OF DIGITAL CBT-I: HEALTHCARE SYSTEM IMPLEMENTATION TO SELF-SUSTAINING ADOPTION

Christopher Miller¹, Danielle Bradley¹, Shane Bole², Matthew Jennings², Benjamin Brennan², Mika Hirata², David Willens², Anupama Nair², David Kalmbach², Christopher Drake³

¹Big Health, ²Henry Ford Health, ³Henry Ford Health System

Introduction: Despite Cognitive Behavioral Therapy for Insomnia (CBT-I) being the recommended first-line treatment, prescription sleep medications remain the most commonly utilized option in practice. Patients and physicians frequently express dissatisfaction with current care and may lack knowledge about digital CBT-I. Fully automated digital CBT-I offers a scalable solution with immediate, standardized, and convenient access to evidence-based treatment, potentially overcoming barriers related to provider availability and geographical limitations. Yet, despite its evidence base, digital CBT-I remains underutilized in US healthcare system settings. Demonstrating scalable, self-sustaining implementation is now needed.

Methods: This implementation study evaluates whether digital CBT-I (SleepioRx) could achieve sustained adoption after active implementation support ended. We offered digital CBT-I across Henry Ford Health System using Normalization Process Theory (NPT) as a guiding framework. Staff training sessions and systematic reminders were provided to facilitate provider engagement and patient uptake for the first 18 months (June 2023–December 2024). Patients presenting with insomnia were consecutively offered SleepioRx via the Epic electronic health records system. Implementation was assessed through electronic order rates and provider workflow acceptability during and after the active implementation period.

Results: By December, 2025, N=4,487 patients were ordered digital CBT-I across Henry Ford's clinical system (150 per month). During the 18-month active implementation period (June 2023–December 2024), N=2,576 patients received an order (143 per month). In

the 12 months following cessation of active implementation efforts, N=1,911 additional patients were ordered treatment; representing a sustained monthly adoption rate of approximately 159 patients/month post implementation support. Adapting the electronic order process enabled clinicians to provide immediate digital access without disrupting workflows over time. This continued expansion despite cessation of active implementation support highlights the entrenchment and self-sustaining adoption of digital CBT-I as routine clinical treatment. Provider feedback indicated digital CBT-I enhanced stepped care-based insomnia treatment delivery without increasing workload.

Conclusion: This implementation study demonstrates that digital CBT-I can achieve self-sustaining clinical adoption. The 75% increase in patient orders after active implementation ceased provides robust evidence that NPT-guided embedding creates durable practice change.

Support (if any): Big Health Inc. provided access to SleepioRx for Insomnia. The study was conducted as part of Henry Ford Health System's digital therapeutic implementation initiative.

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0443

TIME COURSE OF TREATMENT RESPONSE IN DIGITAL CBT-I: EVIDENCE FOR RAPID EARLY IMPROVEMENT IN SLEEP EFFICIENCY

Shimin Ooi¹, Michael Xia²

¹Princeton University, ²Duke University

Introduction: Understanding the time course of treatment response in digital cognitive behavioral therapy for insomnia (dCBT-I) is critical for treatment optimization and patient expectations. Standard CBT-I protocols span 6-8 weeks, yet whether improvements occur gradually throughout treatment or concentrate in early sessions remains unclear. Identifying when therapeutic gains occur could inform optimal treatment duration and enable early non-responder identification. We characterized the week-by-week trajectory of sleep improvements across an 8-week dCBT-I program.

Methods: Adults (N=3,237) with insomnia enrolled in an 8-week dCBT-I program and completed daily sleep diaries. Sleep efficiency (SE) and total sleep time (TST) were measured weekly. Week-by-week changes were analyzed using repeated measures ANOVA. Response patterns were examined by calculating proportion of total improvement achieved by weeks 2, 4, and 6. Sample sizes varied by week due to progressive dropout (Week 1: n=2,230, Week 4: n=1,281, Week 8: n=528).

Results: Among all participants, SE improved from 74.7% at Week 1 to 87.0% at Week 8 (+12.3 percentage points total). The largest single improvement occurred between Week 1 and Week 2 (+9.0 percentage points, 73% of total improvement, $p < 0.001$), with subsequent weekly gains declining sharply (Week 2-3: +1.6%, Week 3-4: +1.5%, Week 4-5: +0.3%). By Week 4, participants achieved 98% of the total 8-week improvement (+12.1 of 12.3 points). TST followed a similar pattern, increasing from 6.13 to 6.84 hours over 8 weeks (+0.71 hours), with most gains (0.48 hours, 68%) occurring in the first 3 weeks. Post-Week 4, SE improvements plateaued with only +0.2 percentage points gained between Weeks 4-8. The rapid early response pattern was consistent across both objective (SE) and subjective (sleep duration) measures.

Conclusion: Digital CBT-I produces rapid early improvements in sleep efficiency, with 73% of total gains occurring in the

first week and 98% by week 4. This rapid response pattern has important implications for treatment expectations, early non-responder identification, and potential for abbreviated treatment protocols. The early trajectory may also explain dropout patterns, as many participants achieve meaningful benefit before full program completion. These findings challenge the standard 6-8 week CBT-I duration and suggest opportunities for adaptive treatment approaches based on early response.

Support (if any):

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0444

ADVERSE EFFECTS OF SUPRATHERAPEUTIC DOSING OF ZOLPIDEM IN FEMALE PATIENTS

Christina Rios¹, Bhanu Kolla², R. Robert Auger³

¹Mayo Clinic-Rochester, ²Mayo Clinic, ³Mayo Clinic College of Medicine

Introduction: Zolpidem is a commonly prescribed FDA- approved hypnotic. In 2013, the FDA recommended reducing maximum dosing of zolpidem in female patients due to concern for slower elimination time as compared to their male counterparts. Despite this, none of the FDA warnings or communications cited published studies that support the claim that women are at increased risk of adverse events. Subsequent prescribing data has shifted to reflect FDA recommendations. In this study we examined risks of using above FDA recommended doses in female patients.

Methods: This is a retrospective chart review including all adult female patients (> 18 years old) evaluated and managed at the Mayo Clinic Center for Sleep Medicine between 1/1/2024 to 12/31/2024. Detailed review of Mayo Clinic's EMR was accomplished with subjects on zolpidem split into supratherapeutic and non-supratherapeutic dosing groups. Subjects were relegated to the above maximum dose group if they were ever prescribed FDA-defined supratherapeutic dosing (>5 mg IR formulation or >6.25 mg ER formulation) for a >1 week period. Adverse events were defined as: falls, parasomnias, and cognitive impairment determined via ICD-10-CM codes that occurred at any period following zolpidem initiation. We analyzed rates of adverse effects using chi-square test of independence and Fischer's exact test in patients with or without supratherapeutic dosing.

Results: 435 female patients met inclusion criteria. Among the demographic characteristics, only weight was associated with receiving a higher dose of zolpidem ($P < 0.001$). There were similar rates of adverse effects in both dosing groups with 11.4% of female patients on supratherapeutic dosing as compared to 10.9% of female patients on non-supratherapeutic dosing reporting adverse effects (chi-square test of independence ($X^2=6.5$, $N=435$, $p=0.99$) or Fischer's exact test ($OR=1.05$, $p=0.87$).

Conclusion: Overall, there was not a significant difference in rates of adverse events in female patients receiving supratherapeutic vs non-supratherapeutic doses of zolpidem during the time frame described. Further studies are warranted to better

elucidate longitudinal risk of adverse effects related to gender-related differences with zolpidem dosing.

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0446

EXPERIENCES IN PERINATAL CARE: AN EXAMINATION OF SLEEP CONCERN ASSESSMENT, AWARENESS, AND MANAGEMENT

Maristella Lucchini¹, Ivan Vargas², Kaylin Hill², Shambhavi Thakur³, Natalie Barnett¹

¹Nanit Lab, ²University of Notre Dame, ³Nanit

Introduction: Sleep disturbances are common during pregnancy and postpartum, yet prolonged sleep disruptions can pose serious health risks. Although behavioral, pharmacological, and complementary treatments, including cognitive-behavioral therapy for insomnia (CBT-I), are effective and safe, sleep problems frequently go unaddressed. Limited research has examined how sleep concerns are discussed and managed in perinatal clinical care. This study evaluated U.S. perinatal individuals' awareness of treatment options for sleep disturbances.

Methods: Postpartum individuals (18 years or older) from the U.S. were recruited via email in July 2025 to complete an online survey. Eligibility required giving birth within the past 12 months. Insomnia symptoms were assessed using the Insomnia Severity Index (ISI), categorized as no insomnia, subthreshold (8-14), or clinical (≥ 15). Participants also reported their familiarity with insomnia treatments and whether healthcare providers inquired about sleep and/or offered treatment recommendations during pregnancy and postpartum visits.

Results: A total of 527 individuals completed the survey. Participants averaged 33.4 ± 4 years; most were White (74%), employed full time (67.5%), and married (90%). Based on ISI scores, 49.6% reported no insomnia, 34% subthreshold insomnia, and 16.4% clinical insomnia. During pregnancy, 36.7% were asked about sleep and only 10.6% received any treatment recommendation, most commonly over-the-counter (OTC) options (65.4%), followed by relaxation/mindfulness (11.5%) and prescription medications (9.6%). No participants were offered CBT-I. Postpartum, 33.5% were asked about sleep, and only 3.4% received treatment suggestions, again primarily OTC or relaxation-based strategies. Participants were highly familiar with melatonin (84.8%), OTC sleep medications (74.6%), and prescription medications (70.2%). Fewer recognized behavioral treatments: 54.3% were familiar with relaxation or mindfulness therapies, 34.7% with sleep hygiene, 14.4% with CBT-I, 4.4% with stimulus control, and 2.7% with sleep restriction therapy.

Conclusion: Perinatal sleep disturbances were common, with half of participants reporting at least subthreshold insomnia. Yet only about one-third were asked about sleep, and treatment recommendations were rare, especially postpartum. Critically, despite evidence that CBT-I is effective in this population, no participants received evidence-based behavioral therapies.

Support (if any):

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0447

DIFFERENTIAL EFFECTS OF CBT-I AND BRIGHT LIGHT THERAPY ON INHIBITORY CONTROL AND RISK-TAKING BEHAVIOR IN YOUTHS WITH COMORBID INSOMNIA AND EVENINGNESS

Xin Xi Chen¹, Forrest Tin Wai Cheung², Xiao Li¹, Rachel Ngan Yin Chan³, Joey Wing Yan Chan³, Albert Martin Li⁴, Colin Espie², Michael Gradisar⁵, Yun Kwok Wing³, Shirley Xin Li⁶

¹The University of Hong Kong, ²University of Oxford, ³Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong,

⁴Department of Paediatrics, Faculty of Medicine, The Chinese University of Hong Kong, ⁵WINK Sleep Pty Ltd., ⁶Department of Psychology, The University of Hong Kong, Hong Kong Special Administrative Region, Hong Kong

Introduction: Comorbid insomnia and eveningness are common in youth. Although cognitive behavioral therapy for insomnia (CBT-I) is well-established, it is unclear how CBT-I combined with circadian-targeted bright light therapy (BLT) impacts impulsivity-related cognitive processing in this population. This study examined effects of CBT-I with and without BLT on inhibitory control and risk-taking behavior using computerized neurocognitive tasks in youths with comorbid insomnia and eveningness.

Methods: A total of 146 participants (mean age = 19.9, SD = 3.2, 55.5% female) with DSM-5 insomnia disorder and eveningness (Reduced Morningness-Eveningness Questionnaire ≤ 11) were randomized into six weeks of CBT-I with BLT (CBT-I+BLT, N = 50), CBT-I with placebo light (CBT-I-BLT, N = 53), or waitlist group (N = 43). Inhibitory control and risk-taking behavior were assessed using Cue Go/No-Go (CGNG) task and Balloon Analogue Risk Task (BART). Linear mixed models were applied controlled for age, gender, depression and time of testing.

Results: In the CGNG task, significant Time $\times$ Group interactions were found for Cue and No-cue Reaction times (RTs) (Cue: $F = 3.21$, $p = 0.044$; No-cue: $F = 3.50$, $p = 0.033$), with only CBT-I-BLT group showing significant longer RTs from pre to post-treatment (cue: $p = 0.001$; No-cue: $p = 0.003$) without increased inhibition errors, suggesting enhanced response caution. In BART, a significant Time $\times$ Group interaction was observed for overall risky behavior attempts (All adjusted pumps: $F = 3.25$, $p = 0.042$). Both CBT-I+BLT ($d = 0.59$, $p = 0.019$) and CBT-I-BLT groups ($d = 0.62$, $p = 0.025$) had increased adjusted pumps relative to waitlist, suggesting heightened exploratory engagement. Notably, only CBT-I+BLT demonstrated a significant within-group increase in total earnings ($d = 0.26$; $p = 0.046$), suggesting adaptive risk-taking behavior. No other behavioral indices showed significant between-group differences.

Conclusion: CBT-I significantly enhanced response caution and adjunct BLT further improved adaptive risk-taking, reflecting changes in impulsivity-related cognitive processing in youths with insomnia and eveningness. Future studies could examine the mechanisms (e.g., reward processing) underlying

these decision-making changes following CBT-I and bright light therapy.

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0448

FREQUENCY OF HYPNOTIC MEDICATION USE AT BASELINE DIFFERENTIALLY IMPACTS MEAN ISI REDUCTION FOLLOWING DCBT-I

Raquel Osorno¹, Nicole Gumpert², Norah Simpson², Rachel Manber¹

¹Department of Psychiatry and Behavioral Sciences, Stanford University, ²Stanford University

Introduction: Digital Cognitive Behavioral Therapy for Insomnia (dCBT-I) is a patient-led, online, non-pharmacological intervention proven effective for insomnia. Digital programs are cost-effective and convenient, but not all patients respond equally well. Identifying who may not respond as well a priori could ensure timely connection to more appropriate treatment and effectively allocate limited behavioral sleep medicine resources. The present study analyzed differences in treatment response between groups of participants taking hypnotic medications with varying frequency at baseline: 0, between 1 and fewer than 4 times, or 4 or more times per week.

Methods: Data were drawn from 118 participants in the RCT of Stepped-Care Sleep Treatment in General Practice (RESTING Study) randomized to dCBT-I. For eligibility, participants had to be 50 years or older and meet DSM-5 criteria for insomnia disorder. The sample was divided into three groups based on the frequency of use of prescription sleep medications at baseline: taking no sleep medications (NO-MEDS; N=74), taking medication four or more times per week (HIGH-MED; N=28), and the rest (LOW-MED; N=16). Insomnia was measured via Insomnia Severity Index (ISI). Hypnotic medication use at baseline was measured via the patient self-report. We computed Cohen's d effect sizes (ES) for change in ISI from baseline to 2-months in the three groups.

Results: Results showed a moderate effect size for NO-MED (baseline ISI mean=15.8, SD=4.2, 2-mo ISI mean=12.58, SD=5.06, $d=.69$), a very large effect size for LOW-MED (baseline ISI mean=17.3, SD=4.0, 2-mo ISI mean=12.8, SD=3.9, $d=1.13$), and a moderate effect size for individuals in the HIGH-MED group (baseline ISI mean=15.32, SD=4.61, 2-mo ISI mean=12.67, SD=5.46, $d=.53$).

Conclusion: In the present study, the highest effect size for reduction in ISI from baseline to 2-months was observed among participants taking sleep medication at least one but fewer than 4 times per week at baseline. Relevant to the interpretation of these results is the fact that this group had the highest mean ISI score at baseline. To further understand this result, future work could explore the impact of potential mediating factors, such as the spontaneous reduction is the use of prescription sleep medication.

Support (if any): Support: R01AG057500

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0449

ADAPTATION AND PILOT TESTING OF A MINDFULNESS-BASED INSOMNIA AND SYMPTOM MANAGEMENT INTERVENTION FOR WOMEN WITH BREAST CANCER IN RURAL AREAS

Hannah Fisher¹, Natalie Chou¹, Emily Patterson¹, Laura Fisher¹, Margaret Falkovic¹, Christina Makarushka¹, Heather Parnell¹, Shauna Malone¹, Linda Sutton¹, Lynda Owen¹, Kara Kenan², Tamara Somers¹

¹Duke University School of Medicine, ²Going Beyond the Pink, LLC

Introduction: Insomnia is a prevalent symptom that exacerbates other cancer symptoms (e.g., fatigue, distress, pain), that in turn worsen sleep. Behavioral interventions are recommended for insomnia but are often not adapted or made available for cancer patients in rural, medically underserved areas. Nite2Day is a mindfulness-based, behavioral insomnia and symptom management intervention previously pilot-tested in hematologic cancer. We are conducting a mixed-methods study to adapt and pilot test Nite2Day in breast cancer patients in rural, medically underserved areas.

Methods: Phase I involved interviews with breast cancer patients (N=8) and oncology clinicians (N=6). Patients self-reported insomnia (Insomnia Severity Index), fatigue (PROMIS-Fatigue), distress (PROMIS-Anxiety; Depression), pain (Brief Pain Inventory), mindfulness (Cognitive and Affective Mindfulness Scale), and self-efficacy (PROMIS-Self-Efficacy for Managing Symptoms). Interviews were audio-recorded and transcriptions were analyzed using rapid qualitative analysis. Phase II involves a single-arm pilot trial (N=15) to evaluate feasibility (accrual, attrition, adherence), acceptability (intervention satisfaction), and changes to self-report outcomes from baseline to post- and 1-month post-intervention.

Results: Phase I patients (Mage=60, 63% Black, 56% Stage I) and clinicians (e.g., oncologist; Mage=48, 83% Female, 50% White) reported that insomnia symptoms are common and worsen post-diagnosis (M ISI Total: 13 [SD=6]). Reasons for insomnia included physical (e.g., pain) and psychological (e.g., stress) symptoms, and lifestyle behaviors (e.g., caffeine, napping). Participants were enthusiastic about the protocol, especially its focus on mindfulness and behavioral skills to address symptoms, as well as its remote, individual, and brief (6-session) format. Some concerns were cited regarding videoconferencing technology, session scheduling, and mindfulness definitions. Telephone and evening sessions were made available, and definitions of mindfulness principles (e.g., beginner's mind) were revised to incorporate images and examples relevant to breast cancer. Phase II is underway (N=7/15).

Conclusion: Phase I feedback informed adaptation of the Nite2Day protocol for breast cancer patients in rural, medically underserved areas. If Phase II pilot results are positive, next steps include efficacy testing. This research has the potential to expand access to a mindfulness-based, behavioral insomnia and symptom management intervention to a population with limited access to critical symptom management.

Support (if any): Community Outreach and Engagement Pilot Award, Duke Cancer Institute (P30CA014236).

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0450

APP-GUIDED MINDFULNESS MEDITATION FOR PATIENTS WITH INSOMNIA: MIXED-METHODS STUDIES TO INFORM FEASIBILITY AND ACCEPTABILITY

Yan Ma¹, Peter Wayne¹, Janet Mullington², Suzanne Bertisch¹, Gloria Yeh²

¹Brigham and Women's Hospital, ²Beth Israel Deaconess Medical Center

Introduction: Mindfulness meditation (MM) apps have gained popularity as a tool for promoting sleep. However, little is known, about the use of MM apps specifically at bedtime, or the efficacy and mechanisms of such practice on insomnia symptom severity and pre-sleep arousal.

Methods: In Phase 1, we conducted a mixed-methods single-arm pilot study to explore the feasibility of 4 weeks of app-guided bedtime MM practice using in-lab polysomnography and at-home (heart rate monitor and actigraphy) assessments, and self-reported sleep assessments (questionnaires and sleep diaries) in 10 participants with insomnia disorder with sleep initiation difficulties. In Phase 2, we conducted focus groups (16 patients with chronic insomnia and 8 experienced instructors) to identify facilitators and barriers to app use, and explore suggestions for integration with the bedtime routine for informing intervention refinement for a future randomized controlled trial.

Results: Phase 1 completion rates were over 90% with 95% completion of in-lab studies, 100% completion of questionnaires, 91% adhered with the intervention. Self-reported measures suggested improvement in sleep quality (PSQI change of -3.7, 95% CI: -6.7, -0.7), insomnia severity (ISI change of -4.5, 95% CI: -7.7, -1.4), and pre-sleep arousal (PSAS change of -7.7, 95% CI: -13.1, -2.3). Qualitative data revealed benefits and skills imparted by mindfulness including: decreased catastrophizing; acceptance/non-reactivity; body awareness/relaxation; self-kindness; awareness of sleep hygiene/bedtime routine; earlier defusing of stress; increased focus and presence; and calm throughout the day. In phase 2, suggestions from experienced instructors included setting up appropriate expectations, instructions on novel content and repetitive practice, integrating sleep hygiene tips in bedtime app use and MM practice.

Conclusion: The study of bedtime app-guided MM for insomnia disorder with both in-lab and remote home sleep assessments is feasible and acceptable. In preparation for future efficacy or mechanistic studies, it is important to refine the MM app intervention and study protocol according to clinical sleep recommendations to minimize heterogeneity in implementing the practice, and to decrease risks of app use at night. Our findings provide valuable information to inform the design of clinical and mechanistic research examining app-guided MM to impact insomnia severity and pre-sleep arousal.

Support (if any): Harvard Osher pilot grant, NCCIH K23AT012475.

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0451

EFFECTIVENESS OF TRADITIONAL CHINESE MEDICINE-BASED LIFESTYLE INTERVENTION FOR INSOMNIA: SYSTEMATIC REVIEW AND META-ANALYSISShirong Wu¹, Wing-Fai Yeung¹, Jiayin Ruan², Man Ling Ng¹, Yan Yi Fong¹, Haiyong Chen³, Fiona Yan-Yee Ho⁴, Heidi Ka Ying Lo⁵, Danny Yu⁶¹The Hong Kong Polytechnic University, ²New York University Rory Meyers College of Nursing, ³School of Chinese Medicine, The University of Hong Kong, Hong Kong SAR, China, ⁴Department of Psychology, The Chinese University of Hong Kong, Hong Kong SAR, China, ⁵Department of Psychiatry, The University of Hong Kong, Hong Kong SAR, China, ⁶School of Chinese Medicine, The Hong Kong Baptist University, Hong Kong SAR, China**Introduction:** The treatment of Traditional Chinese Medicine-based lifestyle (TCM-L) intervention for insomnia has not yet been thoroughly studied. This study aimed to systematically review and synthesize the existing evidence on the effects of TCM-L intervention for insomnia in adults.**Methods:** A comprehensive search of 11 databases included all records available from inception to September 2025. Randomized controlled trials (RCTs) examining the effect of TCM-L interventions for insomnia were included. The risk of bias was assessed using version 2 of the Cochrane risk of bias tool for randomized trials, and the quality of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system. Meta-analyses were conducted using R (version 4.3.2).**Results:** A total of 14 RCTs involving 1,730 participants were included in this review. Results showed that, compared with usual care or no intervention ($k = 11$, MD = -4.28 , 95% CI [-5.38 , -3.18], $p < 0.0001$, $I^2 = 96.1\%$), TCM-L interventions demonstrated significantly greater improvements. For comparisons with lifestyle modifications ($k = 1$, MD = -1.62 , 95% CI [-2.04 , -1.20]; $p < 0.0001$), TCM health education ($k = 1$, MD = -2.05 , 95% CI [-3.01 , -1.09]; $p < 0.0001$), and CBT-I ($k = 1$, MD = -2.05 , 95% CI [-2.60 , -1.50]; $p < 0.0001$), only data from single studies were reported due to the lack of multiple eligible studies for meta-analysis. Subgroup analyses supported the finding that the TCM-L intervention is more effective at improving insomnia among participants recruited from hospitals ($k = 8$, MD = -4.97 , 95% CI [-6.08 , -3.86], $I^2 = 94.6\%$) than from the community ($k = 3$, MD = -2.56 , 95% CI [-4.11 , -1.00], $I^2 = 96.1\%$). Sensitivity analysis using the leave-one-out method confirmed the statistical robustness of our findings. There was no evidence of publication bias.**Conclusion:** Our findings provide preliminary evidence supporting the potential benefits of TCM-L interventions for relieving insomnia. Larger, high-quality RCTs are needed to confirm these results.**Support (if any):** The Chinese Medicine Development Fund supported this project, Hong Kong Special Administrative Region, China (Project No. 24B2/045A_R1).

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0452

EFFICACY AND SAFETY OF DUAL OREXIN RECEPTOR ANTAGONISTS VS BENZODIAZEPINE-RECEPTOR AGONISTS IN CHRONIC INSOMNIA: A SYSTEMATIC REVIEW AND META-ANALYSISMidila Bapineni¹, Naga Vamsi Krishna Machineni¹, Shivendra Tangutoori¹, Maneesh Gaddam²¹Appalachian Regional Healthcare, ²Hazard ARH Regional Medical Center**Introduction:** Chronic insomnia affects 10–20% of adults and despite cognitive behavioral therapy being first-line, hypnotics remain widely used in practice. Benzodiazepine-receptor agonists (BzRAs), such as zolpidem, are effective for short-term usage but have limited safety data beyond 2–4 weeks, with around 50% of long-term users developing tolerance, dependence or withdrawal. Dual orexin receptor antagonists (DORAs), including suvorexant, lemborexant, and daridorexant, offer a novel mechanism by blocking orexin receptors and suppressing wake-promoting signaling, and may provide sustained efficacy with fewer adverse effects.**Methods:** We systematically reviewed PubMed, Embase, Cochrane Library, and ClinicalTrials.gov for studies published between 2020 and 2025, including randomized controlled trials (RCTs), observational studies, and meta-analyses comparing DORAs to BzRAs in adults with chronic insomnia. Outcomes included sleep latency (SL), total sleep time (TST), wake after sleep onset (WASO), and adverse effects (e.g., sedation, cognitive impairment, dependence). Because long-term head-to-head trials are limited, short-term RCTs and long-term placebo-controlled studies were included. Six trials and two meta-analyses involving about 5,000 patients met the inclusion criteria.**Results:** One-month RCTs showed DORA efficacy comparable to or superior to BzRAs. Daridorexant 50 mg was non-inferior to zolpidem 10 mg for WASO reduction (approximately 45 vs 31 minutes). Lemborexant 5 or 10 mg outperformed zolpidem ER 6.25 mg in older adults, improving SL, sleep efficiency, and WASO. Long-term data favored DORAs, with sustained sleep benefits over 6–12 months and no evidence of tolerance or withdrawal. Meta-analysis revealed DORAs shortened SL by about 15 minutes more than BzRAs (mean difference -15.3 min, 95% CI -22.1 to -8.5), with similar TST. Safety profiles favored DORAs: lower risk of next-day sedation (RR 0.1), cognitive impairment (RR 0.65), and dependence (RR 0.38). In a real-world study, switching long-term BzRA users to DORAs led to significant dose reductions with minimal withdrawal.**Conclusion:** DORAs are at least as effective as BzRAs and offer advantages for long-term insomnia management, including sustained efficacy and fewer adverse effects. They may be preferable for patients requiring extended pharmacotherapy. However, definitive long-term comparative RCTs are needed to confirm these findings and evaluate broader outcomes such as cognitive function and quality of life.**Support (if any):**

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0453

FEASIBILITY AND PRELIMINARY OUTCOMES OF MULTIDISCIPLINARY CBTi + EXERCISE PROGRAM FOR INSOMNIAHyun Jung Hong¹, Sung A. Kong², Semina Jung³, Yoon Kyung Han⁴, Eun Yeon Joo⁵¹Department of Neurology, Samsung Medical Center, Seoul, Korea, ²Department of Health Sciences and Technology, SAIHST, Sungkyunkwan University, Seoul, Korea. Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea, ³Department of Neurology, Samsung Medical Center, ⁴Department of Nursing, Samsung Medical Center, Seoul, Korea., ⁵Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea**Introduction:** Insomnia is a common sleep disorder with multifactorial origins. Cognitive Behavioral Therapy for Insomnia (CBTi) is the first-line treatment, yet adherence remains challenging. Physical activity may enhance engagement and outcomes. This study evaluated the feasibility and preliminary results of a multidisciplinary program integrating CBTi with home-based resistance exercise (RE).**Methods:** Between April–October 2025, 77 participants (mean age 58.6 ± 12.9 years; 71.4% female) at Samsung Medical Center were randomized to CBTi + RE, CBTi only, or RE only. The CBTi program comprised four structured sessions over 1.5–2 months, including cognitive restructuring, anxiety reduction, and behavioral techniques (stimulus control, sleep restriction, relaxation, sleep hygiene). The RE program spanned 9 months in three phases, each with outpatient evaluations, remote guidance, and video-based progressive resistance training with stretching. Participants tracked progress via sleep and exercise diaries.**Results:** Completion rates were highest in CBTi + RE (55%), followed by CBTi (53%) and RE (47%). Dropout was lowest in the integrated group (10%) compared to CBTi (42%) and RE (26%). While no participants in single-modality groups remained active, 29% of the integrated group continued participation. Because CBTi ended within 2.5 months and RE extended over 9 months, direct comparisons between CBTi + RE and CBTi alone were limited. Preliminary findings showed significant improvements in sleep efficiency (actigraphy/diaries), rising from $78.27 \pm 11.08\%$ to $86.24 \pm 6.74\%$ ($t = 2.51$, $p = 0.023$). PSQI scores improved significantly ($t = -4.46$, $p < 0.001$), while ISI scores showed a non-significant reduction ($t = -1.62$, $p = 0.126$). Chair stand performance (30 sec) improved from 22.67 ± 5.28 to 26.33 ± 7.05 ($t = 3.39$, $p = 0.006$), indicating enhanced lower-body endurance.**Conclusion:** The integrated CBTi + RE program demonstrated higher retention and completion rates than single-modality interventions, with significant gains in sleep quality and physical function. A combined cognitive-behavioral and physical approach may improve adherence and outcomes in insomnia treatment. Further results are expected upon completion of the 9-month RE schedule, particularly regarding sleep and mood.**Support (if any):**

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0454

PREDICTORS OF CBT-I ADHERENCE IN PREGNANT WOMEN: THE ROLE OF PREGNANCY-RELATED STRESS AND TREATMENT FORMATNatalie Wong¹, Ching Yiu Ng¹, Xiao Li¹, Ran Wang¹, Wing Cheong Leung², So-ling Lau³, Joey Wing Yan Chan⁴, Rachel Ngan Yin Chan⁴, Antoinette Lee¹, Yun Kwok Wing⁴, Rachel Manber⁵, Shirley Xin Li⁶¹The University of Hong Kong, ²Kwong Wah Hospital, ³The Chinese University of Hong Kong, ⁴Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong, ⁵Department of Psychiatry and Behavioral Sciences, Stanford University, US, ⁶Department of Psychology, The University of Hong Kong, Hong Kong Special Administrative Region, Hong Kong**Introduction:** Pregnant women represent a unique population with vulnerabilities to mood disturbances, insomnia and stress. Past research has shown that more severe mood and insomnia symptoms at baseline predicted poorer treatment adherence in cognitive behavioral therapy for insomnia (CBT-I). However, research on treatment adherence in pregnant women remains limited. This study aimed to examine whether mood, insomnia, stress and treatment format could predict adherence in pregnant women receiving CBT-I.**Methods:** 73 pregnant women with DSM-5 insomnia disorder and ISI score ≥ 8 participated in a 6-session CBT-I program delivered either in a group-based (age: 34.9 ± 3.23 years, gestation week: 25.7 ± 4.53) or App (age: 34.3 ± 3.23 years, mean gestation week: 25.7 ± 5.58) format. They completed questionnaires assessing perinatal stress (Pregnancy Stress Rating Scale, PSRS), perinatal depression (Edinburgh Postnatal Depression Scale, EPDS), and insomnia severity (Insomnia Severity Index, ISI) at baseline. Adherence was evaluated using the Treatment Components Adherence Scale. Linear regression models were conducted for each adherence outcome, with EPDS, ISI, PSRS as independent variables and age as a covariate.**Results:** Improvement in insomnia symptoms was significantly associated with overall treatment adherence, $r(71)=0.328$, $p=0.002$. The linear regression model for cognitive adherence showed a significant overall fit ($R = 0.401$, $R^2 = .161$, $F(5,67) = 2.56$, $p = 0.035$). Higher pregnancy-related stress was associated with poorer adherence to cognitive elements ($\beta = -0.01$, $p = 0.013$); compared to App, group CBT-I was associated with better cognitive adherence ($\beta=0.39$, $p=0.037$). The model for behavioural adherence was not statistically significant ($R = 0.319$, $R^2 = 0.102$, $F(5,67) = 1.52$, $p = 0.195$).**Conclusion:** The findings suggest that both the format of therapy and pregnancy-related stress may influence adherence to the cognitive elements of CBT-I in pregnant women. Elevated pregnancy-specific stress may amplify worries that hinder engagement in sleep-related cognitive restructuring. Future research may explore the potential effects of tailoring sleep intervention to address pregnancy-specific stress and whether such adaptations

could enhance treatment adherence and improve clinical outcomes.

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0455

PROVIDER NUMBER AS A HIDDEN METHODOLOGICAL ISSUE IN BEHAVIORAL INTERVENTION TRIALS FOR INSOMNIA: A META-ANALYSIS

Funmilayo Abudu¹, Jazmin Mulé¹, Michelle Garrison²

¹Purdue University, ²Sleepy Science

Introduction: Despite trials consistently showing the benefits of behavioral interventions for insomnia such as Cognitive Behavioral Therapy for Insomnia (CBT-I) and mindfulness based interventions, attempts to scale these efforts up to broad implementation have not always resulted in the same levels of effect. It is possible that study design factors that are often underreported — such as provider number and characteristics — may result in decreased generalizability of trial results.

Methods: We searched PubMed and PsycInfo for RCTs of behavioral sleep interventions delivered to adults or adolescents with insomnia by a human provider. We used the Covidence platform for review of the abstracts and full text, requiring consensus by two team members at each stage. Quantitative meta-analysis was conducted using StataSE to explore effect size and heterogeneity, with meta-regression to test whether low or unstated provider number was associated with an increased effect size.

Results: Of the 142 included studies, 75 reported ISI scores at baseline and follow-up and are analyzed here; only 49 reported the number of providers (including 21 with a single provider), and only 5 reported whether effect sizes differed across providers. After meta-analysis, the resulting weighted Hedge's *g* across all included studies of 1.67 (95%CI 1.11 to 2.22) represents a large effect size. However, visualization demonstrated potential publication bias and substantial heterogeneity of treatment effects (HTE). In the meta-regression, even after adjusting for known drivers of HTE (year of study, time to follow-up, baseline severity), the number of intervention providers remains a significant driver, with studies having 4+ providers showing significantly worse effect sizes than studies with fewer providers (adjusted difference in Hedge's *g* of -3.10, 95%CI -6.02 to -0.17).

Conclusion: The most readily evaluated mechanisms of our observed results include publication bias and challenges with intervention fidelity. More challenging to evaluate is the possibility that the effect sizes of some intervention trials (especially those with 1-3 providers) may rest at least in part in factors outside the intervention itself, such as in the personal characteristics of the providers.

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0456

REDUCING INSOMNIA IN NIGHTSHIFT WORKERS WITH LIGHT THERAPY: PERSONALIZATION USING CONSUMER-BASED WEARABLE TECHNOLOGY

Marleigh Tregger¹, Christopher Drake², Olivia Walch³, Philip Cheng²

¹Henry Ford Sleep Research, ²Henry Ford Health System,

³Arcascope, University of Michigan

Introduction: In nightshift workers, insomnia is frequently caused by circadian misalignment which can be alleviated with targeted light interventions. However, generic “light at night” interventions do not account for the widely variable circadian phases among night shift workers. To address this, we used consumer-based wearables (Apple Watch [AW]) to predict circadian phase and inform personalized light therapy. We previously demonstrated that AW-informed light-dark schedules produce greater phase shifts; here, we extend this approach by examining its impact on insomnia symptoms. We hypothesized the AW-informed light therapy would result in greater reduction of insomnia symptoms following treatment vs the generic (i.e., non-personalized) light therapy.

Methods: Participants (N=85) were randomly assigned to either the AW-informed or generic light schedules. Insomnia severity for both daytime (ISI-D) and nighttime (ISI-N) sleep periods were measured before and after treatment. AW accelerometer and heart rate data over two weeks were processed through a biomathematical model of the human circadian system. Those in the AW-informed group received light schedules based on their circadian phase predictions. Participants in the control group followed a generic light schedule (light from 18:00 and 21:00; light avoidance from 04:00 and 10:00). Both groups implemented schedules with light boxes and blue-blocker glasses. Changes in insomnia severity associated with the treatment was quantified using a difference score (Post-treatment – Pre-treatment), with negative numbers indicating improved insomnia.

Results: The AW-informed group showed improved ISI-D (-1.9 ± 5.8 SD) compared to exacerbated insomnia in the control group ($+1.7 \pm 5.5$ SD), $t(84) = -2.43$, $p = .017$. No significant differences were found for ISI-N (AW-informed: -1.0 ± 4.9 SD, generic: -0.6 ± 5.4 SD).

Conclusion: These findings support the use of AW as a consumer-based wearable to conduct personalized light treatments for nightshift workers. Accessible and effective circadian treatments are key to improving the safety of nightshift workers. Future research should examine facilitators and barriers of real-world implementation of personalized light interventions.

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0457

DOXEPIN AND MIRTAZAPINE USE IN CHILDREN AND ADOLESCENTS WITH SYMPTOMS OF INSOMNIA – A SINGLE-CENTER RETROSPECTIVE REVIEW*Christine Palladino, Robin Varughese, Pavkovic Ivan, Sanjeev Kothare*
Cohen Children's Medical Center - Northwell Health

Introduction: Sleep disorders are a common issue in children, with pediatric insomnia an underrecognized and undertreated problem affecting children. Beyond melatonin and behavioral interventions, there are few options known to clinicians that have been studied for use in pediatric insomnia. The objective of this study is to assess the efficacy, tolerability and safety of doxepin and mirtazapine in pediatric insomnia.

Methods: This is a retrospective single-center chart review of children less than 18 years of age at the time of treatment initiation who have previously failed behavioral intervention and melatonin, who were then treated with doxepin and/or mirtazapine. Patients were started on doxepin maintenance treatments ranging from 2-10mg and/or mirtazapine, which ranged from 1.875- 15mg. Improvement in sleep was assessed on follow up visits and recorded using a 4-point Likert scale.

Results: There were 318 pediatric patients included for analysis. We identified 183 patients on doxepin, 24 patients on mirtazapine, and 19 patients who were on dual doxepin-mirtazapine. In the doxepin group, 167 patients (91.26%) experienced improvement in insomnia symptoms. In the mirtazapine group, 16 patients (66.67%) experienced improvement in insomnia symptoms. In the doxepin-mirtazapine group, 13 patients (68.42%) experienced improvement in insomnia symptoms. Thirty-two patients (10%) and three patients (7%) who took doxepin and mirtazapine, respectively experienced adverse effects, most commonly aggression/irritability.

Conclusion: We found both doxepin and mirtazapine as effective and tolerable treatment options in improving subjective sleep onset and maintenance issues in children with insomnia.

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0458

EARLIER CBT-I START LEADS TO QUICKER SYMPTOM IMPROVEMENT IN PATIENTS WITH CHRONIC INSOMNIA DISORDER*Kristina Lenker¹, Raegan Atha², Caitlin Paquet³, Julio Fernandez-Mendoza⁴*¹Penn State College of Medicine, ²Penn State Health Sleep Research & Treatment Center, ³Brigham and Women's Hospital, Harvard Medical School, ⁴Penn State University, Hershey

Introduction: Insomnia is the most common sleep disorder, with approximately 15% of adults meeting criteria for chronic insomnia disorder (CID). Cognitive-behavioral therapy for insomnia (CBT-I) is the first-line guideline-recommended treatment, supported by strong evidence for its short- and mid-term efficacy. However, less is known about how the timing of CBT-I initiation influences insomnia symptom severity in routine clinical practice.

Methods: Participants included a pool of 121 adults (47.99±15.8 years old, 69% female, 17.1% minority) who received CBT-I for

CID at the Behavioral Sleep Medicine (BSM) program of Penn State Health Sleep Research & Treatment Center. Participants completed the Insomnia Severity Index (ISI) at their consultation visit and each subsequent treatment visit. Linear mixed-effects models tested changes in ISI across CBT-I sessions, adjusting for sex, age, race/ethnicity, psychiatric and medical comorbidities, comparing patients who initiated treatment at their consultation visit (52.5%) versus those who initiated treatment at least 2-weeks after (47.5%).

Results: There was a significant main effect of CBT-I session on ISI scores, indicating decreasing ISI across the 8 sessions ($F(7,4543)=36.88$, $p<.001$). There was a significant interaction between timing of treatment initiation (initiation at consultation vs initiation ≥ 2 weeks later) and CBT-I sessions, with patients who initiated CBT-I at consultation showing a steeper decline in ISI across sessions compared with those who started later ($F(7,4542)=2.59$, $p=.013$). Specifically, patients who initiated treatment at consultation demonstrated significantly lower ISI scores through sessions 2 to 4.

Conclusion: Initiating CBT-I at the time of consultation produced a faster early reduction in insomnia severity, though both immediate and delayed treatment groups showed substantial ISI improvements by the last session. These findings highlight the clinical value of obtaining two weeks of sleep diary data upon referral and prior to consultation, enabling clinicians to accurately assess patients' sleep-wake patterns and begin evidence-based treatment at the time of case formulation and patient feedback.

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0459

EFFECTS OF LEMBOREXANT ON SLEEP ARCHITECTURE IN CHINESE, KOREAN, AND AMERICAN/EUROPEAN PARTICIPANTS WITH INSOMNIA*Gary Zammit¹, Yong Won Cho², Dinesh Kumar³, Naoki Kubota⁴, Naoto Yamakawa⁴, Takao Takase⁴, Jocelyn Cheng³, Lin Lu⁵, Margaret Moline³*¹Clinilabs, ²Keimyung University School of Medicine, ³Eisai Inc., ⁴Eisai Co., Ltd., ⁵Peking University Sixth Hospital, Peking University Institute of Mental Health, NHC Key Laboratory of Mental Health (Peking University), National Clinical Research Center for Mental Disorders (Peking University Sixth Hospital)

Introduction: It is important to understand whether there are differences in sleep architecture depending on the race of the patient. The lemborexant (LEM) clinical program provided information based on polysomnography (PSG) studies conducted in North America, Europe, China and South Korea.

Methods: E2006-G000-304 (Study 304; NCT02783729), E2006-J086-311 (Study 311; NCT04549168), and E2006-J082-204 (Study 204; NCT05594589) were 1-month, multicenter, randomized, double-blind, placebo (PBO)-controlled, parallel group studies evaluating the efficacy and safety of LEM in adults with insomnia disorder. Study 304 enrolled participants (≥ 55 y) of any race. Study 311 participants were ≥ 18 y and exclusively Chinese. Study 204 participants were 19–80y and exclusively South Korean. In Studies 304 and 311, pairs of PSGs were conducted during a single-blind PBO run-in (baseline), after the first 2 doses of LEM or PBO, and after the last 2 doses (end of 1-month). In Study 204, one PSG was conducted during a single-blind PBO run-in (baseline) and after

the last dose (end of 1-month). All 3 studies included LEM 10mg (LEM10) and PBO; Studies 304 and 204 also included LEM 5mg (LEM5), and Study 304 included zolpidem (LEM5 and zolpidem are not reported here). Analyses of sleep architecture parameters included change from baseline in total sleep time (TST), rapid eye movement (REM) sleep, REM latency, total non-REM (NREM) sleep, and stages N1–N3 sleep.

Results: Populations for the current analyses comprised 477 participants (PBO, n=208; LEM10, n=269), 193 participants (PBO, n=100; LEM10, n=93), and 39 participants (PBO, n=13; LEM10, n=26) for Studies 304, 311, and 204, respectively. In all studies, after 1 month, LEM10 treatment elicited larger increases (improvements) from baseline in TST, REM, NREM total, and stages N1 and N2 and decreases from baseline in REM latency compared with PBO. Stage N3 sleep was not different following treatment with LEM10 versus PBO. In the 3 studies, LEM was well tolerated, with most treatment-emergent adverse events being mild or moderate in severity.

Conclusion: Consistent findings of sleep architecture improvements from these 3 studies support the use of LEM in patients with insomnia, regardless of race.

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0460

EFFICACY AND SAFETY OF DARIDOREXANT IN INDIVIDUALS WITH INSOMNIA WITH SHORT SLEEP DURATION AND NORMAL SLEEP DURATION

Julio Fernandez-Mendoza¹, Paul Saskin², Orestis Briasoulis², Joana Marques Barros², Fjola Sigurdardottir³, Yves Dauvilliers⁴

¹Penn State University, Hershey, ²Idorsia Pharmaceuticals US, ³University of Oslo, ⁴Sleep–Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier

Introduction: Insomnia with objective short sleep duration has been identified as a distinctive phenotype notable for increased physiological hyperarousal and cardiometabolic risk. This phenotype has been associated with a suboptimal response to cognitive-behavioral therapy for insomnia (CBTi) in preliminary studies and has been proposed to respond better to pharmacotherapy. Daridorexant, a dual-orexin receptor antagonist, has demonstrated efficacy and safety in pivotal trials (NCT03545191) of individuals with insomnia disorder. This post-hoc analysis from the 301 study examined efficacy and safety of daridorexant in individuals who demonstrated less than 6 hours of objective total sleep time (TST) on baseline polysomnogram (PSG) recording.

Methods: 930 participants with insomnia disorder received daridorexant 25 mg, 50 mg, or placebo for 3 months in a randomized, placebo-controlled, parallel-group clinical trial with polysomnography. Individuals underwent 2 consecutive nights of PSG at baseline, end of Month 1 and end of Month 3. Efficacy endpoints included changes from baseline in PSG-measured wake after sleep onset (WASO), latency to persistent sleep (LPS) and TST, as well as self-reported Insomnia Severity Index (ISI) and Insomnia Daytime Symptoms and Impact Questionnaire (IDSIQ).

Results: 688 (74%) subjects demonstrated an average PSG-measured TST lower than 360 minutes at baseline [i.e., Insomnia with Short Sleep Duration (ISSD)]. Mean age was 56.9 years (SD=15.1) and 65% were female. Daridorexant significantly

improved WASO [Month 3 difference to placebo, LSM mean of -12.50 (3.52) for daridorexant 25 mg, p 0.0004 and -18.11 (3.59) for daridorexant 50 mg, p< 0.0001] and LPS [-7.70 (2.92), p 0.008 and -11.95 (2.98), p< 0.0001 for 25 and 50 mg, respectively]. At month 3, daridorexant 50 mg - not 25 mg - significantly improved all the domains and the total score of IDSIQ [total score, LSM -7.67 (2.03), p 0.0002]. Similarly, only daridorexant 50 mg significantly improved ISI over 3 months. No significant treatment-related adverse events associated with use of daridorexant were seen.

Conclusion: Individuals with ISSD benefited from 3 months of continuous treatment with daridorexant 50 mg, both objectively and subjectively. The findings highlight the efficacy and safety of daridorexant for this complex group of insomnia patients.

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0461

EVALUATING THE RELATIONSHIP BETWEEN RUMINATION AND INSOMNIA ACROSS CBTI IN DEPRESSED ADULTS

Julia Merrill¹, Ellen Converse¹, Raquel Osorno¹, Natalie Solomon¹, Leanne Williams¹, James Gross², Jun Ma¹, Jerome Yesavage¹, Rachel Manber¹, Jared Saletin³, Andrea Goldstein-Piekarski¹

¹Department of Psychiatry and Behavioral Sciences, Stanford University, ²Department of Psychology, Stanford University,

³Psychiatry and Human Behavior, Alpert Medical School of Brown University

Introduction: Previous work suggests that ruminative thoughts, even when not sleep-related, are associated with more severe insomnia symptoms. However, few studies have examined whether interventions that target insomnia may also improve rumination over time. It remains untested whether improvements in insomnia severity resulting from CBTi are driving improvements in rumination. Likewise, it is unknown whether the link between higher rumination and insomnia is present at all assessed timepoints. Here we conducted a secondary analysis of a previous single-arm mechanistic CBTi trial (NCT04424407) to test the hypotheses that (1) CBTi would be associated with improvements in rumination, (2) improvements in rumination would be associated with improvements in insomnia, and (3) that these associations would persist after treatment.

Methods: Fifty individuals (age mean $\pm$ SD = 40.36 $\pm$ 10.95 years; 64% female; 48 completers), with co-occurring insomnia and depressive symptoms completed the insomnia severity index (ISI) and Ruminative Responses Scale-Short (RRS) before and after receiving 6-sessions of CBTi. Linear mixed effects models tested the impact of CBTi on rumination, longitudinal associations between ISI and RRS, and whether treatment moderated these associations. Linear regression tested associations between symptoms changes. Age and sex were included as covariates in all models.

Results: CBTi was associated with an improvement in rumination (b=-2.65, p=0.002) following treatment. Improvements in insomnia symptoms were not associated with changes in rumination (b=-0.04, p=0.85). Rumination and insomnia were not associated with each other overtime (b=0.05, p=0.74). Moderation analyses revealed that the associations were not different across timepoints (b=0.03, p=0.90): ISI and RRS were not associated at baseline nor post-treatment ($|b|$'s < 0.07, p's > 0.70).

Conclusion: CBTi was associated with improvement in rumination at post-treatment. However, counter to our hypotheses,

insomnia and rumination symptoms were not associated. Limited variability in insomnia and rumination scores in our sample may be occluding our expected effects (i.e. all participants had insomnia/depression at study entry). These findings indicate that improvements in rumination following CBTI may not be due to changes in insomnia itself. Future studies should examine whether subcomponents of rumination, mood variability, or broader sleep health shape these relationships.

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0462

HYPERTENSION STATUS MODERATES INSOMNIA AND ATROPHY OF THE LEFT SUPERIOR FRONTAL GYRUS INTERACTION IN WOMEN WITH FIBROMYALGIA

Priscilla Amofa-Ho¹, Theresa Brown¹, Jason Craggs¹, Ashley Curtis², Roland Staud³, Richard Berry³, Christina McCrae¹

¹University of South Florida, ²Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ³University of Florida

Introduction: The left superior frontal gyrus (L-SFG) is integral to higher-level cognition. Poor sleep decreases L-SFG connectivity with other brain regions and impairs cognitive performance. Conversely, atrophy of L-SFG can contribute to insomnia. Hypertension (HTN) raises the risk of insomnia and L-SFG atrophy. People with chronic pain are susceptible to insomnia, HTN, and brain atrophy, but their complex interaction remains unclear. We explore how HTN status influences the relationship between insomnia and the integrity of L-SFG in individuals with chronic pain.

Methods: Baseline data from female adults (N=27) diagnosed with fibromyalgia and chronic insomnia underwent a one-night ambulatory polysomnography (PSG; Comet-PLUS Portable, Natus Neurology) to record sleep and assess the presence of any sleep disorders as part of a RCT (R01AR055160 and R01AR055160-S1; NCT02001077). Anatomical scans were obtained for all participants. Participants reported hypertension status (Y/N). Moderation analysis with SPSS Process Macro was used to examine relationships between PSG total awakenings (frequency), L-SFG, and hypertension status (moderator).

Results: Moderation analysis showed a significant interaction between total awakenings and hypertension status ($B=0.04$, $SE=0.01$, $t=2.44$, $p=0.02$), indicating hypertension status significantly influences the relationship between total awakenings and the integrity of L-SFG. The link between total awakenings and L-SFG was negative and significant among participants without hypertension ($B=-0.04$, $SE=0.08$, $t=-4.62$, $p=0.0001$), but not significant among those with hypertension ($B=-0.003$, $SE=0.01$, $t=-0.24$, $p=0.81$). This suggests individuals without hypertension experienced greater atrophy in L-SFG as awakenings increased. The overall model explained 48.66% of variance in L-SFG ($F[3,23]=7.27$, $p=0.0013$).

Conclusion: Frequent awakening in women experiencing pain can impair cognition and contribute to brain deterioration, even with fewer cerebrovascular conditions. The findings highlight the importance of preventive measures before conditions like hypertension and insomnia develop. Longitudinal studies and reviews of hypertension management and lifestyle differences could provide additional insights into these results.

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0463

PRELIMINARY FINDINGS FROM COGMUSE-AUT: ADAPTIVE COGNITIVE TRAINING FOR AUTISTIC ADULTS WITH INSOMNIA

Ashley Curtis¹, Susan Rodriguez², Fang Wang³, Amy Costa⁴, Danny Saab³, Gavin Boley³, Micah Mazurek⁵, Christina McCrae²

¹Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida,

²University of South Florida, ³University of Missouri, ⁴University of Pittsburgh, ⁵University of Virginia

Introduction: Autistic adults are an underserved population who experience a high prevalence of insomnia (~80%) and cognitive challenges. Limited access to trained providers for behavioral insomnia treatments, adverse side effects of sleep medications, and the lack of medications to improve cognition has prompted research on alternative behavioral interventions such as cognitive training. Our prior work has shown benefits of multimodal cognitive training to cognition and associated functioning, including sleep, in older adults; but this has not been tested in autistic adults. This study optimized a novel adaptive cognitive training program (COGMUSE-AUT, patent pending) for autistic adults with insomnia and tested its preliminary impact on cognition, pre-sleep arousal and insomnia symptoms.

Methods: Autistic adults (N=6, Mean Age=30.8, SD=12.2; 3 men/3 women) with insomnia [DSM-5 criteria plus either Insomnia Severity Index (ISI) of 10+ or baseline sleep diary confirmation of 6+ nights/14 >30 mins of sleep onset latency or wake after sleep onset] completed 6 weeks of COGMUSE-AUT at home 3x/week for 60mins/day. COGMUSE-AUT (patent pending) is a computerized multimodal cognitive training targeting processing speed, spatial attention, perceptual motor skill, working memory and inhibition. Participants completed assessments of insomnia (Insomnia Severity Index), pre-sleep arousal (Pre-sleep Arousal Scale-cognitive/somatic subscores), and objective cognition (NIH Toolbox-Cognitive Battery) during a 14-day baseline and post-intervention period. Paired t-tests examined outcome change across timepoints.

Results: COGMUSE-AUT led to statistically significant improvements in delayed verbal memory (Rey Auditory Verbal Learning Test-Delayed; $p=.03$, $hedges\ g=.45$, moderate effect) and trending improvements in attention and processing speed (Oral Symbol Digit Test, $p=.059$, $hedges\ g=.16$, small effect), and inhibition (Flanker Task, $p=.085$, $hedges\ g=.11$, small effect). Statistically significant reductions were also observed in pre-sleep cognitive arousal ($p=.02$, $hedges\ g=.43$, moderate effect), trouble falling asleep ($p=.006$, $hedges\ g=.94$, large effect), and trouble staying asleep ($p=.04$, $hedges\ g=.62$, moderate effect).

Conclusion: Preliminary findings indicate that among autistic adults with insomnia, COGMUSE-AUT shows near-transfer benefits to non-trained cognition and far-transfer effects on pre-sleep cognitive arousal, sleep initiation and sleep maintenance. Larger randomized controlled trials with extended follow-up and objective assessment of arousal and sleep mechanisms underlying these transfer effects are warranted.

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0464

PROFILES OF ASMR USERS AND ITS ASSOCIATION WITH INSOMNIA SYMPTOMS

Viviane Kakazu, Sergio Tufik, Gabriel Pires
Universidade Federal de São Paulo

Introduction: Autonomous Sensory Meridian Response (ASMR) is reported as a pleasurable tingling sensation triggered by specific visual and auditory stimuli. Although not supported by proper evidence, ASMR for sleep induction became popular as YouTube content in the last decade. However, concerns have arisen regarding its pattern of use, mostly through digital devices in bed, which can increase sleep latency and worsen symptoms in individuals with insomnia. Due to the limited literature on the subject, it is important to characterize ASMR users in terms of socio-descriptive and sleep-related data. The aim was to describe the profile of individuals who use ASMR content for sleep-related complaints, and its association with insomnia symptoms.

Methods: This was an exploratory cross-sectional survey. Individuals aged 18 or older who consumed ASMR content were recruited through social media and invited to fill out an online survey, including the Insomnia Severity Index (ISI), the Pittsburgh Sleep Quality Index (PSQI), and questions about their ASMR usage habits. The usage was categorized to allow qui-square analyses. Data was presented as absolute frequency (n) and percentage.

Results: Of the 464 participants, 81.9% were female, with a mean age of 26.2±6.8 years; most were highly educated (50.6%), self-declared white (72.2%), and single (81.5%). In the ISI, 258 participants (55.6%) were classified as having severe insomnia, 144 (31%) as moderate, 58 (12.5%) as mild, and only 4 (0.8%) showed no clinically significant insomnia. In the PSQI, 68 participants (14.6%) had good sleep quality and 396 (85.3%) had poor sleep quality. Statistically significant associations were observed between feeling ASMR and poor sleep quality ($p=0.034$) and between higher prevalence of insomnia and consuming ASMR as videos ($p=0.044$). No associations were found between ASMR usage and perceived insomnia symptoms improvement.

Conclusion: ASMR users presented a negative sleep profile (including a high prevalence of severe insomnia) and ASMR usage was not associated with improvements in insomnia symptoms.

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0465

SUVOREXANT IMPROVES INSOMNIA SEVERITY IN MIDLIFE WOMEN WITH NIGHTTIME VASOMOTOR SYMPTOMS AND COMORBID COMPONENTS OF METABOLIC SYNDROME

Shadab Rahman¹, Clara Sailer¹, Aviva Cohn², Hannah Kim³, Liane Hunter¹, Irene Gonsalvez¹, Jessica Harder³, Natalie Feldman¹, Sybil Crawford⁴, Ananya Pani³, Aleta Wiley³, Hadine Joffe⁵

¹Brigham and Women's Hospital / Harvard Medical School,

²Rutgers Robert Wood Johnson Medical School, ³Brigham and Women's Hospital, ⁴UMass Chan Medical School, ⁵Brigham and Women's Hospital / Beth Israel Deaconess Medical Center / Harvard Medical School

Introduction: The menopausal transition is characterized by vasomotor symptoms (VMS) affecting up to 85% of women, which can persist more than 10 years after the final menstrual period. Nighttime VMS precipitate sleep fragmentation and drive clinical care-seeking in midlife women. Poor sleep and adverse metabolic health have a bidirectional relationship, and midlife women have an elevated risk of comorbid metabolic syndrome that can further impair sleep. Limited evidence supports the efficacy of orexin receptor antagonists in reducing insomnia severity and sleep fragmentation in midlife women with nighttime VMS and comorbid components of metabolic syndrome.

Methods: We conducted a single-site randomized, double-blind, placebo-controlled, crossover trial investigating the effects of four-week treatment blocks using the dual orexin receptor antagonist suvorexant (20mg) on insomnia severity and sleep fragmentation in late peri- and early postmenopausal women, who had an insomnia disorder, nighttime VMS, >30 minutes of wake after sleep onset (WASO), and at least one metabolic syndrome component (e.g., prediabetes, hypertension, hyperlipidemia). The primary and secondary endpoints were within-person change over the 4-week treatment block in insomnia severity index (ISI) and diary-reported WASO, respectively. Treatment groups were compared using linear mixed-model regression analysis.

Results: Twenty-nine midlife women were included in the study (mean ± SD age = 54.4 ± 4.7 years; BMI 26.9 ± 4.3 kg/m²). Baseline mean ISI was 15.9 ± 3.6 and WASO was 50.9 ± 20.3 minutes. Suvorexant, as compared to placebo, led to a significantly greater reduction in ISI scores (-5.8 ± 4.9 vs. -2.7 ± 6.2, respectively, $p = 0.04$), and had a greater reduction in WASO (-16.8 ± 20.4 vs. -5.8 ± 22.3 minutes), although this difference did not reach statistical significance ($p=0.14$).

Conclusion: Using a robust cross-over trial design, our results show that, relative to placebo, suvorexant treatment improves insomnia severity in midlife women who have comorbid indicators of metabolic syndrome and may also attenuate sleep fragmentation in those women. These findings build on our prior study in midlife women without components of metabolic syndrome and demonstrate that suvorexant remains effective in this population even with the presence of cardiometabolic disruption.

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0466

EFFECTS OF COGNITIVE BEHAVIOURAL THERAPY AND BRIGHT LIGHT THERAPY ON COGNITIVE FUNCTIONING IN YOUTHS WITH COMORBID INSOMNIA AND EVENINGNESS

Xin Xi Chen¹, Forrest Tin Wai Cheung², Xiao Li¹, Rachel Ngan Yin Chan³, Joey Wing Yan Chan³, Albert Martin Li⁴, Colin Espie², Michael Gradisar⁵, Yun Kwok Wing³, Shirley Xin Li⁶

¹The University of Hong Kong, ²University of Oxford, ³Li Chiu Kong Family Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong,

⁴Department of Paediatrics, Faculty of Medicine, The Chinese University of Hong Kong, ⁵WINK Sleep Pty Ltd., ⁶Department of Psychology, The University of Hong Kong, Hong Kong Special Administrative Region, Hong Kong

Introduction: Insomnia and eveningness are common in youth and their co-occurrence may risk daytime cognitive impairments. While cognitive behavioral therapy for insomnia (CBT-I) could

effectively improve sleep, its impact on youth cognitive functioning is understudied, and whether addressing circadian disturbances associated with insomnia yields greater cognitive performance benefits remains unclear. This study examined the effects of CBT-I with and without BLT on self-reported and objectively measured cognitive performance in youths with comorbid insomnia and eveningness.

Methods: A total of 146 participants (mean age = 19.9, SD = 3.2, 55.5% female) with DSM-5 insomnia disorder and eveningness (Reduced Morningness-Eveningness Questionnaire ≤ 11) were randomized into CBT-I with BLT (CBT-I+BLT, N = 50), CBT-I with placebo light (CBT-I-BLT, N = 53), or waitlist group (N = 43). Assessments included subjective sleep quality (Pittsburgh Sleep Quality Index, PSQI), sleep duration (sleep diary and actigraphy), subjective (Cognitive Failures Questionnaire, CFQ) and objective cognitive performance (working memory, episodic memory, executive function). Treatment effects were analyzed using linear mixed models controlled for age, gender, depression, and time of testing.

Results: A significant Time $\times$ Group interaction was observed for sleep quality (PSQI, $F = 4.69$, $p = 0.011$), with both CBT-I groups showing a greater improvement than the waitlist (all $ps < 0.001$). No between-group differences were found for subjective or objective sleep duration (all $ps > 0.05$). For neurocognitive outcomes, a significant Time $\times$ Group interaction was observed for subjective cognitive performance (CFQ total: $F = 3.47$, $p = 0.034$; Distractibility: $F = 4.88$, $p = 0.010$), with significant within-group improvements observed only in CBT-I-BLT group (CFQ total: $p < 0.001$; Distractibility: $p = 0.009$). No significant between-group differences were found for any objective cognitive measures.

Conclusion: CBT-I significantly improved sleep quality and self-reported cognitive functioning in youth with insomnia and eveningness, though no effects were observed on objectively measured cognitive abilities. Adjunct bright light therapy did not further enhance the treatment effects on cognitive functioning. Longer-term follow-up is warranted to examine the treatment effects over time in this youth population.

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0467

A HEALTH LITERACY ADAPTATION OF BRIEF BEHAVIORAL THERAPY FOR INSOMNIA FOR ENGLISH AND SPANISH -SPEAKING ECONOMICALLY MARGINALIZED ADULTS

Hatty Lara¹, Carolina dos Santos², Anna Revette³, Lindsay Rosenfeld⁴, Suzanne Bertisch⁵

¹Department of Psychology, University of Arizona, ²Brigham & Women's Sleep Medicine, ³Dana Farber Cancer Institute, ⁴Boston University School of Social Work, ⁵Brigham and Women's Hospital

Introduction: Economically marginalized adults experience disproportionate insomnia burden and face barriers to accessing behavioral insomnia treatments. Health literacy-adapted interventions can reduce participant burden, improve understanding, and enhance behavioral enactment. We iteratively adapted an evidence-based Brief Behavioral Treatment for Insomnia (BBTI) for English- and Spanish-speaking economically marginalized adults for use in an effectiveness trial.

Methods: Participants (Mage = 42.1 $\pm$ 15.4; 60% non-Hispanic/Latino; 14 female) rated the adapted manual as clear, easy to follow, and respectful in tone, confirming it as a "good program". User feedback informed several refinements: (1) enhanced visual clarity by simplifying graphics (e.g., a new homeostatic sleep drive illustration); (2) expanded insomnia education (definitions, risk factors, perpetuating mechanisms); (3) revised wording to increase clarity, actionability, and patient-friendliness (e.g., replacing "rules" with "steps"); and (4) added guidance for common barriers (e.g., shift work, caregiving). Pilot testing (Mage = 40.4 $\pm$ 4.0; 40% Hispanic/Latino; 3 female) supported high overall acceptability and usability of the adapted materials (e.g., "easy to understand") and improved insomnia severity (ISI Mpre = 17.0 $\pm$ 4.2; Mpost = 10.0 $\pm$ 1.0).

Results: Participants (Mage = 42.1 $\pm$ 15.4; 60% non-Hispanic/Latino; 14 female) rated the adapted manual as clear, easy to follow, and respectful in tone, confirming it as a "good program". User feedback informed several refinements: (1) enhanced visual clarity by simplifying graphics (e.g., a new homeostatic sleep drive illustration); (2) expanded insomnia education (definitions, risk factors, perpetuating mechanisms); (3) revised wording to increase clarity, actionability, and patient-friendliness (e.g., replacing "rules" with "steps"); and (4) added guidance for common barriers (e.g., shift work, caregiving). Pilot testing (Mage = 40.4 $\pm$ 4.0; 40% Hispanic/Latino; 3 female) supported high overall acceptability and usability of the adapted materials (e.g., "easy to understand") and improved insomnia severity (ISI Mpre = 17.0 $\pm$ 4.2; ISI Mpost = 10.0 $\pm$ 1.0).

Conclusion: Health literacy-informed adaptations improved the usability and acceptability of BBTI materials for economically marginalized English- and Spanish-speaking adults. Incorporating health-literate design may reduce patient burden and enhance fidelity and effectiveness of behavioral insomnia interventions.

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0468

CANNABIS USE IN PREGNANT WOMEN SEEKING TREATMENT FOR INSOMNIA

Amanda Yu, Heba Afaneh, David Kalmbach, Amy Loree, Matthew Jennings, Philip Cheng, Anthony Reffi, Andrea Hochberg, Christopher Drake
Henry Ford Health System

Introduction: Introduction. Prenatal sleep problems are common with half of women developing insomnia by the end of pregnancy. Cannabis use during pregnancy has recently increased due to the perceived benefits for pregnancy-related discomforts including insomnia. The present study sought to describe the rates of cannabis use among pregnant women seeking treatment for insomnia. Moreover, we characterized the sociodemographics and clinical presentations of pregnant women with current or former cannabis use.

Methods: Methods. Four-hundred-and-seven pregnant women (Age: 30.7 $\pm$ 4.9yrs; Gestation: 25.7 $\pm$ 3.4wks, 47.8% non-white) seeking insomnia treatment in a large health system completed an online health survey. Outcomes included sociodemographics, Insomnia Severity Index (ISI), Edinburgh Postnatal Depression

Scale (EPDS), suicidal ideation (EPDS item#10), Perinatal Rumination Scale-Night (PRS-Night), and cannabis use (never, former, current use).

Results: Results. Most patients denied any history of cannabis use ($n=270/407$; 66.3%), whereas 127 patients endorsed former use (31.2%). A smaller proportion reported current cannabis use during pregnancy ($n=10/407$; 2.5%). Sociodemographic comparisons showed that current users were younger than former and never users (current vs former vs never: age 31.28 ± 4.62 vs 29.73 ± 5.14 vs 26.40 ± 4.50 , $p < .001$), reported lower income ($< \$50K$ rates: 80.0% vs 48.8% vs 25.2%), and were least likely to be in a committed relationship (60.0% vs 76.3% vs 91.1%, $p < .001$). Regarding clinical presentation, current users reported the highest severity of insomnia (ISI: 17.40 ± 4.20 vs 15.20 ± 5.36 vs 13.03 ± 5.22 , $p < .001$), depression (EPDS: 15.50 ± 6.40 vs 11.08 ± 5.57 vs 8.83 ± 5.11 , $p < .001$), and perinatal rumination (PRS-Night: 27.40 ± 10.53 vs 20.45 ± 10.00 vs 16.48 ± 9.30 , $p < .001$). Current users endorsed higher rates of suicidal ideation (30.0%) than former users (19.8%) and never users (8.5%).

Conclusion: Conclusion. Pregnant women using cannabis are younger, lower income, and less likely to be in a committed relationship than those who formerly or never used. Current users have poorer sleep, greater depression, worse perinatal rumination, and more suicidal thoughts than pregnant women who quit or never used. Given the growing rates of cannabis use during pregnancy, these data highlight that cannabis use is highest among women from vulnerable segments of the population, and that cannabis use is linked to greater sleep and mood pathology, despite any ostensible benefits cannabis might be perceived to have.

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0469

CHANGES IN PHYSICAL FUNCTION AND SLEEP QUALITY ACCORDING TO COMPLIANCE WITH A HOME-BASED RESISTANCE EXERCISE PROGRAM IN PATIENTS WITH CHRONIC INSOMNIA

Sunga Kong¹, Semina Jung², Yoon Kyung Han³, Eun Yeon Joo⁴

¹Sungkyunkwan University, ²Department of Neurology, Samsung Medical Center, ³Department of Nursing, Samsung Medical Center, ⁴Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine

Introduction: To evaluate the efficacy of a 3-month home-based resistance exercise program on sleep quality and physical function in patients with chronic insomnia, and to examine whether exercise adherence moderates the relationship between physical improvements and sleep outcomes.

Methods: Between April 2024–November 2025, 137 participants (mean age 59.5 ± 10.6 years; 77.4% female) at Samsung Medical Center were recruited for a non-face-to-face RE program. The RE program spanned 9 months and included outpatient evaluations, remote guidance, and video-based progressive resistance training with stretching. Assessments were conducted at baseline (Time 1) and 3-month follow-up (Time 2). Exercise adherence was assessed and categorized as high ($n=51$, 49.5%), moderate ($n=28$, 27.2%), or

low ($n=24$, 23.3%) based on completion rates and exercise during 3moths. Primary outcomes were Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI). Secondary outcomes included ISI component scores, skeletal muscle index (SMI), grip strength, chair stand test, and psychological measures. Paired t-tests were used to evaluate pre-post changes, and correlation analyses stratified by adherence level examined the relationship between change of physical function and sleep score improvements.

Results: ISI and PSQI improved significantly by 20% and 11%, respectively. Sleep latency decreased by 41.4%, and sleep duration increased from 5.70 to 6.13 hours. SMI increased significantly by 0.06 kg/m^2 . Exercise adherence moderated key outcomes, with the high-adherence subgroup demonstrating a strong negative correlation between SMI and ISI changes ($r = -0.506$, $p = 0.005$). Participants with high adherence and SMI improvement showed the greatest reduction in ISI (-5.92 points, 42%) and significantly greater reductions in body fat percentage compared with the low-adherence group.

Conclusion: Home-based resistance exercise produced significant improvements in sleep quality and muscle mass in patients with chronic insomnia. The link between muscle gains and sleep improvement appeared only among highly adherent participants. High adherence is therefore essential for maximizing the clinical benefits of exercise-based insomnia interventions.

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0471

COMBINATION TREATMENT FOR CHRONIC INSOMNIA DISORDER IN ADULTS: AN AMERICAN ACADEMY OF SLEEP MEDICINE CLINICAL PRACTICE GUIDELINE

Daniel Buysse¹, J. Todd Arnedt², Luis Buenaver³, Judy Chang⁴, Julio Fernandez-Mendoza⁵, Salma Patel⁶, Eric Zhou⁷, Suzanne Hyer⁸, Uzma Kazmi⁹, Mandeep Singh¹⁰, Yngve Falck-Ytter¹¹, Emerson Wickwire¹²

²University of Pittsburgh, ³Michigan Medicine, University of Michigan, ⁴Johns Hopkins University School of Medicine, Department of Psychiatry and Behavioral Sciences, ⁵San Jose Military Entrance Processing Station, ⁶Penn State University, Hershey, ⁷The University of Arizona, ⁸Harvard Medical School, ⁹American Academy of Sleep Medicine, ¹⁰Formerly at the American Academy of Sleep Medicine, ¹¹University of Toronto, ¹²Case Western Reserve University, ¹³University of Maryland School of Medicine

Introduction: This guideline establishes clinical practice recommendations for use of combination treatment for chronic insomnia disorder in adults versus cognitive-behavioral therapy for insomnia (CBT-I) or pharmacotherapy alone. Combination

treatment is defined here as treatment with CBT-I started concurrently with pharmacotherapy.

Methods: The American Academy of Sleep Medicine (AASM) commissioned a task force of experts in sleep medicine to develop recommendations and assign strengths to those recommendations based on a systematic review of the literature and an assessment of the evidence using the GRADE process. The task force provided a summary of the relevant literature, the certainty of evidence, the balance of benefits and harms, patient values and preferences, and resource use considerations that support the recommendations. The AASM Board of Directors approved the final recommendations.

Results: The following recommendations are intended as a guide for clinicians on the use of combination treatment for chronic insomnia disorder in adults. Each recommendation statement is assigned a strength (“Strong” or “Conditional”). A “Strong” recommendation (i.e., “We recommend...”) is one that clinicians should follow under most circumstances. A “Conditional” recommendation (i.e., “We suggest...”) is one that requires that the clinician use clinical knowledge and experience and strongly consider the patient’s values and preferences to determine the best course of action. One recommendation includes a remark that provides additional context to guide clinicians with implementation of this recommendation.

Conclusion: Conditional recommendation for: 1. In adults with chronic insomnia disorder, the AASM suggests the use of combination treatment with CBT-I plus insomnia medication over insomnia medication alone. (Conditional recommendation, low certainty of evidence). Conditional recommendation against: 2. In adults with chronic insomnia disorder, the AASM suggests against the use of combination treatment of CBT-I plus insomnia medication over CBT-I alone. (Conditional recommendation, low certainty of evidence). Remark: Patients who place higher value on increasing total sleep time early in the course of treatment, and/or patients who place lower value on reducing daytime symptoms with treatment, may reasonably select combination treatment vs CBT-I alone.

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0472

EFFECT OF A BEHAVIORAL INSOMNIA INTERVENTION ON 24-HOUR REST-ACTIVITY RHYTHMS IN BREAST CANCER SURVIVORS

Misol Kwon¹, Young S. Seo², Stephanie Griggs³, Pin-Wei Chen⁴, Jonathan Mitchell⁴, Suzanne Dickerson¹

¹University at Buffalo, SUNY, ²Arizona State University, ³Emory University, ⁴Children’s Hospital of Philadelphia

Introduction: Brief Behavioral Treatment for Insomnia (BBTI) improves insomnia symptoms, but its effects on 24-hour rest-activity rhythms (RAR) are not well understood. We evaluated whether BBTi improved RAR parameters compared with an attention control (AC) group among breast cancer survivors (BCS) with insomnia.

Methods: This secondary analysis of a randomized controlled trial of insomnia in cancer survivors was restricted to BCS who

completed both baseline and 1-month actigraphy assessments (N=52; BBTi n=27, AC n=25). Participants were randomized to three weekly sessions of BBTi or an AC healthy eating program and wore a wrist-actigraph (Philips Respironics) for one week at baseline and again 1 month after treatment. Activity count data (60 second epoch) were processed using ActCR and customized function from GGIR package to derive parametric (mesor, amplitude, acrophase) and non-parametric (interdaily stability, intradaily variability, relative amplitude, most active 10-hour midpoint [M10], least active 5-hour midpoint) rest-activity metrics. Linear mixed-effects models were used to assess changes in these metrics over time by treatment group, incorporating time, treatment, and their interaction in the fixed effects portion of the models.

Results: Participants were, on average, 60 years old, predominantly White and married or living with a partner. Time since breast cancer diagnosis averaged 9.6 and 7.4 years in the BBTi and attention control groups, respectively. Baseline insomnia severity was in the subthreshold-moderate range (mean ISI ≈13), and there were no significant between-group differences in demographic, clinical, or insomnia characteristics. Within groups, pre- to post-treatment changes in parametric and non-parametric rest activity metrics were small in the BBTi group. In the AC group, the M10 midpoint became modestly later (~0.4 hours; d≈0.30) with other parameters largely unchanged. Between groups, no significant treatment-by-time interactions were observed for any rest-activity rhythm parameter (all p≥0.09; |d| ≤ 0.42).

Conclusion: In this sample of BCS with insomnia, the BBTi intervention showed no significant group or time effects in actigraphic RAR parameters compared to the AC group over the 1-month period. Larger trials with longer follow-up and interventions that more directly target sleep and circadian health may be needed to meaningfully modify RAR in this population.

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0473

EFFECTS OF BRIEF BEHAVIORAL TREATMENT FOR INSOMNIA IN TRAUMATIC BRAIN INJURY SURVIVORS: A RANDOMIZED CONTROLLED TRIAL

Hsiao-Yean Chiu

Taipei Medical University

Introduction: Insomnia is a common and persistent problem among individuals with traumatic brain injury (TBI), often exacerbating cognitive and emotional difficulties. Brief Behavioral Treatment for Insomnia (BBTi) has demonstrated efficacy across various populations; however, it has not yet been evaluated in patients with TBI. This study aimed to examine the effects of BBTi on sleep and related outcomes in adults with TBI-related insomnia.

Methods: An assessor-blinded, three-arm, parallel-group randomized controlled trial was conducted with 93 TBI survivors presenting with insomnia symptoms. Participants were randomly assigned (1:1:1) to a nurse-guided BBTi group, a mobile-delivered

BBTi app group, or a sleep hygiene control group. The nurse-guided BBTi involved a four-week program comprising two in-person and two telephone sessions focusing on sleep hygiene, stimulus control, sleep restriction, and relaxation techniques. The mobile BBTi group received equivalent content through an application integrating Sleep Aids, My Sleep, and Sleep Reminder functions. The control group received usual care, sleep hygiene education, and weekly LINE contact. Primary outcomes were sleep parameters measured using the Chinese versions of the Insomnia Severity Index, Epworth Sleepiness Scale, and Pittsburgh Sleep Quality Index, along with seven-day actigraphy and sleep diaries. Secondary outcomes included mood and cognitive performance, assessed with the Hospital Anxiety and Depression Scales. Data were collected at baseline, post-treatment, and six- and twelve-month follow-ups, and analyzed using generalized estimating equations.

Results: All 93 participants completed the study. Compared with the control group, both BBTi interventions significantly reduced wake after sleep onset (WASO) and improved sleep efficiency at follow-up (all $p < .05$). The mobile BBTi group showed earlier improvements in WASO at T1 and T3.

Conclusion: Both face-to-face and mobile-delivered BBTi interventions significantly improved sleep outcomes among TBI survivors. The mobile BBTi demonstrated efficacy comparable to nurse-guided BBTi, highlighting its potential as a scalable, accessible approach for managing post-TBI insomnia.

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0474

IMPACT OF SHORT SLEEP DURATION ON COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA IN A BEHAVIORAL SLEEP MEDICINE CLINICAL SAMPLE

Kristina Lenker¹, Raegan Atha², Caitlin Paquet³, Julio Fernandez-Mendoza⁴

¹Penn State College of Medicine, ²Penn State Health Sleep Research & Treatment Center, ³Brigham and Women's Hospital, Harvard Medical School, ⁴Penn State University, Hershey

Introduction: Insomnia with short sleep duration (ISSD) represents a distinct phenotype linked to elevated cardiometabolic risk, unlike insomnia with normal sleep duration (INSD). Cognitive-behavioral therapy for insomnia (CBT-I) is the first-line, guideline-recommended treatment for the disorder, yielding reductions in symptom severity. Recent studies suggest that the ISSD and INSD phenotypes may respond differently to CBT-I, highlighting a need for further inquiry in real-world clinical samples.

Methods: Participants included a pool of 71 adults (47.99±15.8 years old, 66.2% female, 19.2% minority) who received CBT-I at the Behavioral Sleep Medicine (BSM) program of Penn State Health Sleep Research & Treatment Center. Participants underwent a polysomnography (PSG) and were classified as ISSD (PSG total sleep time≤6h; 45.1%) and INSD (PSG total sleep time>6h; 54.9%). Participants completed the Insomnia Severity Index (ISI) at their consultation visit and each subsequent treatment visit. Linear mixed-effects models examined changes in ISI across insomnia

phenotypes and CBT-I sessions, adjusting for sex, age, race/ethnicity, timing, psychiatric and medical comorbidities.

Results: A significant main effect of CBT-I on ISI scores indicated significant improvement across 8 CBT-I sessions ($F(7,236)=17.66$, $p<.001$). A significant interaction between insomnia phenotype (ISSD vs. INSD) and CBT-I sessions showed that ISSD patients had higher ISI scores than INSD patients across sessions ($F(7,236)=3.29$, $p=.002$). INSD patients exhibited a continuous decline in ISI scores, while ISSD patients showed blunted symptom improvement. By session 6 of CBT-I, INSD patients showed ISI scores in the full remission range (6.8 ± 1.5), whereas ISSD patients continued to show ISI scores in the subthreshold range (10.9 ± 1.4).

Conclusion: In a BSM clinical sample, CBT-I reduced insomnia severity in both ISSD and INSD phenotypes, yet INSD patients exhibited greater and more sustained improvement with treatment. In contrast, ISSD patients showed early improvement followed by a plateau and persistently elevated end-of-treatment ISI scores, suggesting a blunted overall treatment response. These pilot findings provide further evidence that distinct insomnia phenotypes exhibit differential treatment responses requiring phenotype-specific therapeutic approaches.

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0475

LONG-TERM MEDICAL TREATMENT OF CHRONIC INSOMNIA: A FURTHER EXPLORATION OF MAINTENANCE REGIMENS

Michael Perlis¹, Knashawn Morales¹, Ivan Vargas², Michael Grandner³, Michael Thase¹, Alexandria Muench⁴, Mark Seewald¹, Ted Kaptchuk⁵

¹University of Pennsylvania, ²University of Notre Dame, ³University of Arizona, ⁴Penn Medicine Princeton Health, ⁵Harvard University

Introduction: At present the uncodified standard for the medical treatment of insomnia is to use hypnotics as needed or intermittently (3-5x per week). While both approaches are dose sparing, neither may provide for the highest rate of treatment responding. Based on prior work, it was hypothesized that intermittent dosing without the interspersing of placebos would be the least effective strategy.

Methods: A four group RCT with longitudinal follow-up was used to evaluate a two-step treatment protocol. In Step-1, all patients were treated nightly with zolpidem (5mg or 10mg) for one month. In Step-2, treatment responses were maintained for up to 3 months with one of four strategies: nightly dosing; intermittent dosing; or intermittent dosing w/ placebos interspersed (either 1 or 3 active doses per week). Group differences were evaluated with an omnibus exact test for response rates, a Log-Rank test for time to relapse, and a GEE model was used to assess sleep continuity.

Results: 115 subjects with chronic insomnia were enrolled in Step-1. 10% of subjects were lost to follow-up. 82 subjects (71%) exhibited treatment responses and were randomized in Step-2 to one of the four maintenance treatment conditions. The positive clinical effects in Step-1 were on sleep latency (reduced by 43%), wake after sleep onset (reduced by 44%), and total sleep time

(increased by 8%). Early morning awakening was largely unaffected (reduced by about 3%). In step-2, the four maintenance strategies did not significantly differ with respect to: relapse rates; latency to relapse; or average sleep continuity. As assessed with a weekly medical symptom check list, the groups did not differ with respect to the incidence, frequency, or severity of medical symptoms.

Conclusion: As expected, Step-1 produced good treatment outcomes. Contrary to expectation, all forms of intermittent dosing used for maintenance therapy were sufficient to maintain treatment response. These results suggest that an optimal strategy for the long-term medical treatment of insomnia is to utilize a two-step regimen: nightly dosing for one month (to maximize treatment responding) and (2) intermittent dosing for maintenance therapy (to reduce the amount of a drug required to maintain therapeutic effects).

Support (if any): N/A

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0476

MINDFULNESS ENHANCES ANTIDEPRESSANT OUTCOMES FOR PREGNANT WOMEN WITH INSOMNIA AND DEPRESSION: A COMPARATIVE EFFECTIVENESS RANDOMIZED CONTROLLED TRIAL

Heba Afaneh¹, David Kalmbach¹, Philip Cheng¹, Anthony Reffi¹, Matthew Jennings¹, Mika Hirata¹, D'Angela Pitts¹, Jason Ong², David Fresco³, Leslie Swanson³, Louise O'Brien⁴, Christopher Drake¹

¹Henry Ford Health System, ²Nox Health, ³University of Michigan, ⁴Michigan Medicine

Introduction: Insomnia affects half of pregnant women and increases risk for depression. Identifying effective treatments for co-occurring insomnia and depression during pregnancy remains a critical priority. Cognitive-behavioral therapy for insomnia (CBTI) improves sleep quality but has limited impact on depression—an effect attributed to persistent cognitive arousal (worry and rumination). Addressing cognitive arousal may enhance depression outcomes in this population. Emerging evidence suggests that mindfulness-based interventions reduce cognitive arousal during pregnancy. This randomized controlled trial (RCT) evaluated the comparative effectiveness of CBTI versus Perinatal Understanding of Mindful Awareness for Sleep (PUMAS), which integrates mindfulness and behavioral sleep strategies.

Methods: One-hundred pregnant women with DSM-5 insomnia disorder and depression were randomized to CBTI or PUMAS. Clinical outcomes included the insomnia severity index (ISI), Edinburgh postnatal depression scale (EPDS), and nocturnal cognitive arousal via the pre-sleep arousal scale's cognitive factor (PSASC). Outcomes were assessed before treatment, weekly throughout therapy, then one week posttreatment. Linear mixed models (LMM) using an intent-to-treat (ITT) approach were used to test treatment effects across repeated measures by evaluating Treatment X Time interactions while controlling for relevant covariates. Insomnia remission was operationalized as posttreatment ISI ≤ 7, and depression remission was operationalized as EPDS < 10.

Results: LMM analyses revealed that both CBTI and PUMAS resulted in insomnia reductions, but that they did not differ from one another ($b = -.14$, $p = .142$). Even so, insomnia remission rates were higher for PUMAS than CBTI (78.0% vs 50.0% remission, $\chi^2 = 8.51$, $p = .004$). Regarding depression, LMM analyses showed that PUMAS produced greater EPDS reductions than CBTI ($b = -.31$, $p < .001$), which corresponded to higher depression remission rates for PUMAS (82.0% vs 58.0% remission, $\chi^2 = 6.86$, $p = .009$). Regarding cognitive arousal, LMM analyses showed that, relative to CBTI, PUMAS produced greater reductions in PSASC ($b = -.34$, $p = .009$). Mediation analysis using PRODClin revealed that PUMAS-linked reductions in depression were mediated by decreases in nocturnal cognitive arousal.

Conclusion: Our findings support imbuing insomnia therapy with mindfulness to alleviate nocturnal cognitive arousal, which may enhance antidepressant effects. This suggests that triaging pregnant women to PUMAS may be appropriate for pregnant patients presenting with comorbid insomnia and depression.

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0477

PATIENT PREFERENCES FOR EVALUATING TREATMENT OF DEPRESSION AND INSOMNIA

Jolynn Jones¹, Maria Martik², Brooke Jennings², Eric Sumpter², Rachel Jang³, Todd Bishop¹, Wilfred Pigeon¹, Robert Bossarte²

¹University of Rochester Medical Center, ²University of South Florida, ³University of Rochester

Introduction: Insomnia and depression are highly prevalent, often co-morbid and contribute to substantial impairment and increased health risks. Although effective pharmacotherapy and psychotherapy treatments exist for both conditions, in real world practice, a minority of patients receive care for both, leading to residual symptoms for untreated conditions. Patient preference for treatment modality or sequence may impact outcomes. Research shows that aligning preferences to treatment conditions improves engagement, the therapeutic alliance, and attendance, whereas mismatches increase attrition. We sought to gather information on patient preferences to guide future research on optimal treatment sequencing, modality and matching via for individuals with co-occurring insomnia and depression.

Methods: We recruited participants via social media to complete an online self-report assessment. N = 101 participants met our inclusion criteria for co-occurring depression and insomnia and completed a 10-item preference survey including: depression and insomnia treatment (medication, therapy, no preference) and the importance of choice in the type of treatment and which problem should be treated first (not/somewhat, very, or extremely important, for each). Participants ordered the importance of indicators of treatment working from most to least important and described their likelihood of participating in research virtually over zoom, other audiovisual options and having study medications mailed sent to their home.

Results: Participants preferred therapy for depression (51%), medication for insomnia (57%), and most said it was extremely important to choose the type (55% for both) and sequencing of treatment (44%). Participants described sleep quality, energy, and mood as the top three indicators that treatment was working. Most were willing to engage in virtual (88%) and research where study medications are mailed to their home (71%). The most reported concern about online therapy was data safety (4 participants) while delayed/lost/stolen medicine, or fear of tampering were the most reported concerns about mailed medications (4 participants each).

Conclusion: Overall, participants with insomnia and depression have distinct preferences for treatment type and sequencing. Most prefer psychotherapy for depression, medication for insomnia, and want to have a choice in which condition is treated first. Understanding patient preferences will be useful in implementing and maximizing treatment efforts for those with co-morbid insomnia and depression.

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0478

PERSONALIZED EXERCISE INTERVENTION DELIVERY FOR PEOPLE WITH INSOMNIA

Chen-Hsiang Yu¹, Chin-Chun Chang¹, Yan Ma²

¹Northeastern University, ²Brigham and Women's Hospital

Introduction: Difficulty falling asleep, decreased sleep quality, and impaired daytime function are common in people with insomnia. Studies support benefits of appropriate exercises in people with insomnia, such as Tai Chi, an exercise that involves mind-body movement, meditation, and breathing techniques. Such multimodal exercise has been shown to be effective as an intervention to improve sleep, promote mental and physical

health in clinical trials. Pre-recorded instructional videos are commonly used in these trials, but people with insomnia are not naturally motivated to exercise following the videos. Therefore, we aim to develop technology-enhanced platforms to facilitate their practice.

Methods: Previously, we successfully developed an IoT-based, home-oriented medical system, Medcare4Home, to support health-record tracking. Recently, we have designed and implemented a new feature to support and engage people with insomnia to practice Tai Chi for better sleep. This feature allows users to choose settings that are appealing to them, and to customize Tai Chi demo videos based on their own preferences. This new feature allows dynamic and real-time video background changes within various themes, and it also enables anytime audio setting changes (e.g., original soundtrack, light music, natural sounds, complete mute, etc.). We have investigated different state-of-the-art multimedia technologies to realize the idea, including video processing (OpenCV, MediaPipe, MODNet, RVM, MatAnyone) and audio manipulation (FFmpeg).

Results: Integration of MediaPipe and OpenCV performed better than other techniques. The Medcare4Home system was successfully converted to Amazon EC2, and the proposed new feature was integrated by MediaPipe and OpenCV, which allows customizable settings for video-guided exercises. Our evaluation testing showed that the system can load videos and adapt real-time choice of settings smoothly with only minor time delay. The system also allows researchers or healthcare providers to track users' exercise adherence remotely. These new features allow Medcare4Home to deliver personalized exercise interventions in home settings.

Conclusion: Existing technologies enable new features in systems like ours to be implemented in home settings to enable multiple users to access personalized exercise for better sleep. Our next steps include efforts to minimize time delay, to include more evidence-based exercises, and to recruit patients with insomnia to test the system for refinement.

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0479

A SYSTEMATIC REVIEW AND META-ANALYSIS FROM A LIFESPAN PERSPECTIVE ON DEGLUTITION DISORDERS AND SLEEP-DISORDERED BREATHING IN CPAP-TREATED PATIENTS

Ana Carolina Xavier Ottoline¹, Maria-Cecilia Lopes², Karen Spruyt³, Jose Renato Castro¹, Alonço Viana-Junior⁴, Debora Petrungraro-Migueis¹

¹Antonio Pedro University Hospital, Fluminense Federal University, Rio de Janeiro, Brazil., ²Child and Adolescent Affective Disorder Program (PRATA), Department and Institute of Psychiatry at University of Sao Paulo Medical School, Sao Paulo, Brazil, ³Université Paris Cité, NeuroDiderot, INSERM, ⁴Department of Otorhinolaryngology, Marcilio Dias Naval Hospital, Rio de Janeiro, Brazil

Introduction: Obstructive sleep apnea (OSA) and sleep disruption by deglutition disorders frequently co-occur, making diagnosis and treatment challenging. Although the prevalence of dysphagia in individuals with OSA and the potential benefits of continuous positive airway pressure (CPAP) therapy on deglutition disorders have been described, the developmental trajectory of dysphagia symptoms across the lifespan remains unclear. COMISA exerts lifelong impacts, amplifying sleep fragmentation, cognitive and emotional burden, cardiometabolic risk, and functional impairment. Its interaction with developmental, aging, and neurobiological processes worsens vulnerability and complicates treatment across the lifespan. This review aimed to estimate the prevalence of dysphagia in individuals with OSA and to assess whether continuous positive airway pressure (CPAP) therapy improves deglutition disorders (gastroesophageal/laryngopharyngeal reflux and dysphagia) across aging processes.

Methods: A systematic review was performed following PRISMA guidelines. Original observational studies evaluating patients with OSA, deglutition disorders, and CPAP therapy were included. There were no age restrictions. Studies involving uncontrolled neurological diseases were excluded. This systematic review is registered at PROSPERO (CRD 42022370632).

Results: Among 120 screened papers, 13 met inclusion criteria, totaling 780 adults and 220 children. Pediatric studies were from the United States of America (USA) whereas the adult participants were mainly from the USA or Australia. Dysphagia prevalence in individuals with OSA ranged from 25% to 27.3%. Most studies focused on moderate to severe OSA. CPAP therapy consistently improved dysphagia symptoms and reduced gastroesophageal reflux manifestations. In pediatric samples, one study reported dysphagia in 28% of infants under two years old referred for tonsillectomy, with OSA being a frequent indication. Most showed symptom improvement after tonsillectomy. Another study involving 126 neonates and infants with OSA noted that the most common intervention was gastroesophageal reflux management (69.8%), and only a minority required positive airway pressure therapy.

Conclusion: CPAP improves deglutition disorders in OSA, whose association with dysphagia is highly complex and extends to COMISA phenotypes. Multimodal management should address respiratory and swallowing endophenotypes, with COMISA patients benefiting from adjunctive muscle therapies. Lifespan

neuromuscular decline and neurodegenerative vulnerability may worsen with chronic sleep disruption. Routine dysphagia screening should be incorporated to optimize outcomes and overall quality of life.

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0480

EFFECTS OF A NOVEL ORAL ORTHOTIC ON PALATOGLOSSAL MUSCLE TONE AS A METHOD FOR MAINTAINING UPPER AIRWAY PATENCY

Scott Simonetti¹, Greg Kamyszek², Colette Cozean³, Clete Kushida⁴
¹Vivos Therapeutics, ²DeNovo Diagnostics, ³The EyeDeas Company, ⁴Stanford University

Introduction: The palatoglossal muscle, which is the only tongue muscle innervated by the vagus nerve, maintains oropharyngeal airway patency. Mandibular advancement devices demonstrate increased airway caliber through anterior tongue repositioning, yet the impact of occlusal modification on palatoglossal tone has not been well characterized. An increase in its resting tone may reduce airway collapsibility and potentially provide a non-invasive mechanism of vagal stimulation. This study evaluated whether a novel unilateral bite-block oral orthotic (UBB) increases resting palatoglossal muscle tone by altering vertical dimension and occlusal contact, by affecting neuromuscular feedback and palatoglossal electromyography (EMG) activity.

Methods: Nineteen healthy adults underwent intraoral surface EMG (sEMG) using the BioEMG III system and a custom 3-D printed palatoglossal surface electrode contoured to the palatoglossal fold and secured intraorally with cyanoacrylate adhesive. For each participant, the UBB was inserted on a side opposite to the electrode lead to avoid wire interference. Each participant completed five baseline pre-UBB and five post-UBB recordings during relaxed nasal breathing in the supine position. EMG amplitudes were compared with nonparametric Wilcoxon Signed-Rank and Sign Tests in Python and SPSS.

Results: Mean resting EMG amplitude increased from $20.77 \pm 20.280 \mu V$ (pre-UBB) to $34.70 \pm 32.859 \mu V$ post-UBB (90.5% increase), with 16 of 19 participants showed higher post-UBB activity. Both the Wilcoxon signed-rank test ($Z = -3.30$, $p < .001$, large effect size $r = .76$) and two-tailed Sign Test ($p = .004$) showed significant increased resting EMG amplitude from pre-UBB to post-UBB conditions.

Conclusion: The UBB significantly increased palatoglossal resting tone. This increase suggests a neuromuscular facilitation effect, potentially mediated by an increase in oral cavity dimensions that direct the tongue superiorly and anteriorly. This would require the palatoglossal muscle to lift and elevate the posterior portion of the tongue. The UBB does not block anterior tongue movement nor prevent a more superior position, and the genioglossus muscle can reposition the tongue anteriorly concurrent to the elevated posterior portion controlled by palatoglossal muscles. This lessens the airway blocking potential of the tongue and may reduce sleep-disordered breathing. These findings support further UBB evaluation as a non-invasive vagus-nerve stimulator capable of enhancing upper-airway muscle stability during sleep and potentially treating sleep-related breathing disorders.

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0481

IMPACT OF AMBIENT AND INDOOR PM_{2.5} EXPOSURE ON THE RISK AND SEVERITY OF OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW AND META-ANALYSIS

Maide Gozde Inam

Columbia University, Irving Medical Center

Introduction: Recent advances in environmental health research have underscored the potential impact of fine particulate matter 2.5 (PM_{2.5}) on sleep-disordered breathing. Emerging evidence suggests that PM_{2.5} may contribute to the pathogenesis of obstructive sleep apnea (OSA) through inflammatory, oxidative, and autonomic mechanisms affecting upper airway stability. Although the cardiopulmonary consequences of PM_{2.5} exposure are well documented, findings regarding its relationship with OSA remain methodologically inconsistent and inconclusive. Given the biologically plausible pathways connecting PM_{2.5} exposure to sleep-related respiratory impairment and the significant public health burden of both air pollution and OSA, a rigorous synthesis of the current evidence is warranted. A meta-analytic evaluation can better delineate the magnitude and consistency of this association.

Methods: This study involved a systematic literature search across PubMed, Scopus, and Web of Science for studies published up to December 2025. Study selection proceeded in two stages, with titles and abstracts screened first, followed by full-text assessment. Studies were considered eligible if they included quantitative assessments of ambient PM_{2.5} exposure and evaluated OSA using polysomnography or validated diagnostic criteria. Data on exposure metrics and OSA-related outcomes were extracted according to a standardized protocol. Heterogeneity and methodological quality were assessed using established criteria, and the review adhered to PRISMA guidelines.

Results: The meta-analysis revealed heterogeneity in the reported associations between PM_{2.5} exposure and both the risk and severity of OSA. Several studies observed that higher ambient PM_{2.5} concentrations corresponded with elevated apnea-hypopnea index values, supporting a potential dose-related relationship between particulate pollution and increased OSA severity.

Conclusion: Our findings indicate that exposure to ambient and indoor PM_{2.5} might be associated with an increased risk and greater severity of obstructive sleep apnea. These results underscore the importance of considering microenvironmental air quality as a potential modifier of sleep-disordered breathing and highlight the need for studies that integrate refined exposure metrics and mechanistic evaluations. Future research may help clarify causal pathways linking particulate pollution to upper airway dysfunction and may inform public health strategies aimed at mitigating pollution-related sleep and cardiometabolic consequences.

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0482

NOVEL BREATH DETECTION ALGORITHM TO ASSESS SLEEP-DISORDERED BREATHING IN A MOUSE MODEL

Cole Winston¹, Huy Pho², Lenise Kim¹, Luu Pham², Vsevolod Y. Polotsky¹¹George Washington University, ²Johns Hopkins

Introduction: Mouse sleep studies are commonly used to observe the effects of trial drugs on sleep and breathing. However, the current manner of detecting breaths is manual, laborious, and often inconsistent, especially over long periods of recordings. To address these limitations, an automated breath detection algorithm was developed.

Methods: Existing gold-standard manually detected and analyzed samples of respiratory recordings from adult male C57BL/6J mice were reanalyzed during NREM (n=16) and REM (n=13) sleep episodes with the algorithm. The algorithm used two third-order Savitzky-Golay filters to remove artifact noise, and calculated baselines using a second-order Butterworth low-pass filter with a cutoff frequency responsive to sample length and normalized by flow signal sampling rate. Flow signal zero-crossings were identified as inspiration starts and ends. Instant respiratory rate (RR), maximal inspiratory flow (V_{imax}), and instant minute ventilation (VE) were calculated and averaged using both manually and automatically marked NREM breaths, REM breaths, and all breaths. Bland-Altman plots were constructed between manual and automatic breathing metrics to determine bias and limits of agreement (LoA) between automatic and manual detection.

Results: The derived data from the algorithm showed high accuracy compared to manual scoring for VE in all, NREM, and REM breaths: 0.67% bias with [-1%, 2.3%] LoA, 0.26% bias with [-2.1%, 2.6%] LoA, and 0.74% bias with [-1%, 2.5%] LoA, respectively. Similar accuracy was achieved for RR: 2.1% bias with [-1%, 5.2%] LoA, 0.25% bias with [-1.2%, 1.7%] LoA, and 5.9% bias with [-0.65%, 5.3%] LoA, respectively. In contrast, there was a positive bias for V_{imax}: 7.1% bias with [2.1%, 12.1%] LoA, 4.2% bias with [0.99%, 7.4%] LoA, and 8.2% bias with [3.6%, 12.8%] LoA, respectively. Subsequent analysis revealed that manual scoring failed to account for baseline drift, leading to later inspiration onsets and V_{imax} discrepancy. For an average of 15.3 minutes of signal per study, the algorithm detected breaths in an average of 0.22 seconds.

Conclusion: The automatic breath detection algorithm showed excellent performance compared to manual analysis, significantly simplifying and expediting sleep study analysis.

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0483

SKELETAL MUSCLE MASS PREDICTS PHYSIOLOGIC BUT NOT SUBJECTIVE SLEEP DISRUPTION ACROSS SLEEP PHENOTYPES

Seok Yeol Yang¹, Hyun Jung Hong², Hea Ree Park¹, Eun Yeon Joo³¹Samsung Medical Center, ²Department of Neurology, Samsung Medical Center, Seoul, Korea, ³Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Introduction: Skeletal muscle mass reflects metabolic and physiologic resilience and may influence sleep through effects on ventilatory stability, inflammatory tone, and arousal susceptibility. Yet its relationship with subjective insomnia severity and PSG-defined sleep fragmentation remains poorly characterized across different sleep disorder phenotypes. This study aimed to determine whether skeletal muscle mass is associated with subjective insomnia symptoms, and to evaluate its relationship with objective arousal metrics on PSG across OSA (Obstructive

Sleep Apnea), COMISA (Comorbid Insomnia and Sleep Apnea), and PI (Primary Insomnia) groups.

Methods: We retrospectively examined 231 adults (OSA $n=109$, COMISA $n=53$, PI $n=69$) who underwent overnight PSG and body composition assessment using direct segmental multi-frequency bioelectrical impedance. Patients were categorized as follows: OSA (AHI ≥ 5 , ISI < 15), COMISA (AHI ≥ 15 , ISI ≥ 15), and PI (AHI < 5 , ISI ≥ 15). Skeletal muscle mass was designated as the primary muscle index. ISI1a (sleep onset), ISI1b (maintenance), ISI1c (early awakening), and ISI total were compared across OSA, COMISA, and PI groups. Pearson correlations assessed associations between muscle mass, ISI components, and PSG parameters.

Results: Mean ages across groups ranged from the early to late 50s, with a male predominance in OSA (81%), COMISA (55%), and PI (33%). Insomnia severity (ISI) was comparable across groups. When examining skeletal muscle mass, lower values were modestly but significantly associated with increased spontaneous ($r=-0.20$) and movement related arousals ($r=-0.26$), suggesting a link between reduced muscle status and physiologic sleep fragmentation. In contrast, skeletal muscle mass showed no significant correlation with insomnia severity indices (ISI subscales or total scores) either in the overall sample or within diagnostic subgroups (all $p>0.10$).

Conclusion: Skeletal muscle mass showed a modest, subclinical association with increased non-respiratory arousal events on PSG, suggesting a potential contribution to physiologic sleep fragmentation. In contrast, muscle mass was not related to patient-reported insomnia severity. These findings indicate that PSG-based evaluation may be particularly informative in individuals with reduced muscle mass, in whom subjective assessments alone may underestimate the extent of sleep disruption.

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0484

THE EFFECT OF STATISTICAL ANALYSIS METHOD ON THE TREND OF OBSTRUCTIVE SLEEP APNEA-INDUCED HEART RATE CHANGE: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

Yuanyuan Zhou¹, Jin-Oh Hahn¹, Susan Redline², Younghoon Kwon³

¹University of Maryland, ²Brigham and Women's Hospital,

³University of Washington

Introduction: Obstructive sleep apnea (OSA) causes intermittent hypoxia and autonomic activation, producing heart rate (HR) changes that reflect cardiovascular stress. Although HR changes during OSA events are widely studied as noninvasive biomarkers, there is no standardized analysis for quantifying these changes, which has led to inconsistent findings. A systematic evaluation is needed to elucidate how analysis choices influence observed HR changes.

Methods: We analyzed polysomnography data from 2,035 participants with validated OSA annotations in the Multi-Ethnic Study of Atherosclerosis Sleep Ancillary Study. ECG-derived HR changes in pre-, intra-, and post-OSA events were evaluated across various (1) HR metrics (mean, quartile, and max-min), (2) analysis window durations for pre- and post-OSA events, (3) OSA segmentations, and (4) OSA episode definitions (combined vs. separate pre-/intra-OSA periods, and using the initial, full, or final portion of the intra-OSA events).

Results: Quartile and max-min metrics produced about 5 times and 8 times larger pre-intra-OSA and intra-post-OSA HR changes than mean metric on average. However, max-min metric showed twice larger variability than quartile metric due to its noise sensitivity. 10–15s analysis window estimated 25–85% larger pre-intra- and intra-post-OSA HR changes than 5s analysis window for all metrics. When analyzing all OSA events, pre-OSA HR may be contaminated by previous post-OSA and thus pre-intra-OSA HR changes were larger relative to when considering OSA events separated by ≥ 60 s with nearly identical results for even larger separations, indicating that 60s is sufficient to exclude potential interference between adjacent OSA events. Combining pre- and intra-OSA periods as intra-OSA period vs. treating them separately affected intra-post-OSA HR changes (mean metric: 15% ↓, max-min metric: 10% ↑, quartile metric: no change). Finally, intra-OSA HR was more interpretable when initial portion or full intra-OSA events were used, whereas using only the final portion often produced patterns contradicting physiological expectations.

Conclusion: Analysis choices influence observed HR changes induced by OSA. Optimizing analyses will improve reproducibility and physiological interpretability of HR-based biomarkers in response to OSA.

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0485

A MULTIDIMENSIONAL AROUSABILITY FRAMEWORK REVEALS DISTINCT RESPIRATORY AND SPONTANEOUS FRAGMENTATION PHENOTYPES IN THE SLEEP HEART HEALTH STUDY

Matthew Gratton¹, Yanming Li¹, Garrett Baber², Nancy Hamilton², Damien Stevens¹, Diego Mazzotti¹

¹University of Kansas Medical Center, ²University of Kansas

Introduction: Sleep fragmentation arises through multiple pathways, including respiratory disturbances and spontaneous shifts in sleep-wake stability, yet traditional metrics reflect only single mechanisms. Arousability describes an individual's propensity to transition from deeper to lighter sleep in response to internal or external triggers. Because standard metrics do not differentiate between respiratory-driven and spontaneous events, they provide limited insight into arousability phenotypes. To address this gap, we developed a multidimensional framework of arousability that more deeply characterizes respiratory-triggered and spontaneous-triggered arousals.

Methods: Data were obtained from the Sleep Heart Health Study, and included participants with complete polysomnography, demographics, and arousability indices ($n=4,909$). Spontaneous or respiratory (apneas, hypopneas, oxygen desaturation) triggers were paired with either arousal (A) or wake-intrusion (WI) events using time-aligned annotations. Four domain-specific indices were calculated, respiratory-A, respiratory-WI, spontaneous-A, and spontaneous-WI. Demographic variables included age, sex, race, and BMI. Multivariable linear regression examined demographic predictors of each domain-specific index, adjusting for age, sex, race, BMI, and AHI.

Results: Arousability domains showed substantial variability across participants. Respiratory-A were relatively infrequent ($M=5.17$, $SD=5.69$), whereas respiratory-WI occurred more frequently ($M=65.30$, $SD=58.58$). Spontaneous-A ($M=12.89$, $SD=5.58$)

and spontaneous-WI ($M=238.72$, $SD=142.93$) were more frequent than Respiratory-A ($M=5.17$, $SD=5.69$; Respiratory-WI ($M=65.30$, $SD=58.58$). Significant sex differences were observed across all domains. Men showed higher respiratory-A ($\beta=2.56$, 95%CI[2.25, 2.87], $p<0.001$), and respiratory-WI ($\beta=21.71$, 95%CI[18.50, 24.92], $p<0.001$) scores than women. Men exhibited significantly lower spontaneous-WI than women ($\beta=-16.70$, 95%CI[-24.65, -8.74], $p<0.001$). In adjusted analyses, Black participants showed lower respiratory-A ($\beta=-3.99$, 95%CI[-6.99, -0.98], $p=0.009$) and spontaneous-A ($\beta=-4.99$, 95%CI[-8.35, -1.63], $p=0.004$) compared to White participants.

Conclusion: A multidimensional arousability framework may provide a more complete representation of sleep fragmentation than traditional metrics. Clear demographic patterns, particularly sex differences in respiratory vs. spontaneous arousals, and race differences in wake-intrusion support the potential utility of multidomain arousability phenotypes for characterizing sleep disorders.

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0486

CEREBELLAR FUNCTIONAL ALTERATIONS AND ELEVATED NOCTURNAL AROUSAL IN PATIENTS WITH COMORBID INSOMNIA AND OBSTRUCTIVE SLEEP APNEA

Yunyun Zhang¹, Jiaming Huang², Qianqian Gao², Xiangming Fang², Xiaochuan Cui²

¹The Affiliated Wuxi People's Hospital of Nanjing Medical University, Wuxi People's Hospital, ²The Affiliated Wuxi People's Hospital of Nanjing Medical University

Introduction: This study aimed to explore the brain functional patterns associated with frequent nighttime awakenings in patients with comorbid insomnia and obstructive sleep apnea (COMISA) to further elucidate the underlying regulatory mechanisms.

Methods: A total of 99 participants were enrolled between March 2024 and February 2025, including individuals with COMISA, insomnia, or obstructive sleep apnea (OSA), as well as healthy controls. All participants underwent demographic and clinical assessments, polysomnography, and brain MRI. MRI metrics were compared across groups, followed by correlation and regression analyses with the arousal index.

Results: Patients with COMISA exhibited more severe insomnia, poorer sleep quality, and greater impairment in daytime functioning. Nocturnal awakenings were more frequent in COMISA than that in insomnia, even after excluding regular hypnotic users. Furthermore, patients with COMISA showed altered activity in the right inferior frontal gyrus, opercular part (IFGoper.R), left middle temporal gyrus (MTG.L), and right cerebellar lobule VIII (Cerebellum_8_R). Functional connectivity (FC) analyses revealed that, within the cerebellum, COMISA patients had stronger FC between the lobule IV-V and the right angular gyrus (ANG.R), but lower FC between the left lobule IX and the left medial orbital superior frontal gyrus (ORBsupmed.L), compared with patients with insomnia. Correlation analyses indicated that the arousal

index was positively associated with body mass index (BMI), hypertension history, apnea-hypopnea index (AHI), and several FC or degree centrality (DC) measures, and negatively associated with gender, years of education, and the fractional amplitude of low-frequency fluctuation (fALFF) value of the Cerebellum_8_R. Further regression analysis showed that the fALFF value of Cerebellum_8_R was independently associated with nocturnal arousal. This association remained significant after adjusting for insomnia severity and sleep efficiency.

Conclusion: This study demonstrated that patients with COMISA experienced more frequent nocturnal arousal than those with insomnia. Reduced functional activity in Cerebellum_8_R was independently associated with increased arousal, even after adjusting for insomnia severity, suggesting a potential role in the neural regulation of nocturnal awakenings. These findings highlight a potential neural target that may complement conventional treatments for nocturnal arousal (Registration No. : ChiCTR 2500095809).

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0487

CHRONIC BUPRENORPHINE-INDUCED CENTRAL SLEEP APNEA AND DESATURATION

Shahrokh Javaheri

Bethesda North Hospital

Introduction: Individuals on opioids are found dead in bed and respiratory depression is a potential cause. In contrast to other opioids, buprenorphine, is a partial μ -opioid receptor agonist and it has been suggested to have reduced respiratory depression with a ceiling threshold. However, death has also been reported in individuals using buprenorphine; yet, it is not known if chronic use of buprenorphine causes significant respiratory depression. The purpose of this study was to determine, if chronic use of buprenorphine is associated with sleep-disordered breathing

Methods: A retrospective study of 11 consecutive patients who were using buprenorphine chronically were referred for evaluation suffering from snoring and daytime sleepiness. All underwent full night polysomnography which was scored page by page by a sleep specialist, according to standard criteria set by the American Academy of Sleep medicine.

Results: Two patterns of breathing were observed First, four of the 11 patients had significant CSA with an average of 13/h of sleep. This pattern was ataxic, similar to other opioids. Those with CSA, compared to those without CSA, suffered from severe sleep apnea (AHI, 35 vs.9/ hour of sleep), which was associated with a significantly low nadir of saturation (75% vs. 87%). Second, the group without CSA, in spite of a low AHI, had significantly more sustained desaturation and were on a relatively higher dose of buprenorphine (8.7 vs.5.2 mg/day).

Conclusion: This is the first study to report chronic use of buprenorphine is associated with sleep-disordered breathing. We observed two specific patterns. A subset with CSA and most severe sleep apnea and very low saturation. Second, buprenorphine was associated with sustained nocturnal hypoxemia, potentially related to hypoventilation. These disordered breathing events could be a potential cause of buprenorphine-associated death reported in the literature.

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0488

DISTINCT THALAMOSTRIATAL FUNCTIONAL NETWORK DYSREGULATION IN COMORBID INSOMNIA AND SLEEP APNEADongyeop Kim¹, Seunghu Kim², Euijin Kim³, Sungkean Kim², Eun Yeon Joo⁴¹Ewha Womans University Seoul Hospital, ²Department of Applied Artificial Intelligence, Hanyang University, ³Department of Human-Computer Interaction, Hanyang University, ⁴Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Introduction: Comorbid insomnia and sleep apnea (COMISA) is a prevalent and distinct phenotype, yet its neural substrates remain poorly defined. Although both insomnia and obstructive sleep apnea (OSA) individually alter brain networks, the combined effect in COMISA has not been systematically examined. We aimed to identify the distinct structural and functional network properties associated with COMISA.

Methods: We studied 124 male participants (45 controls, 58 OSA, 21 COMISA). Structural covariance networks were derived from cortical thickness data, and functional networks were constructed from resting-state fMRI time-series. Using graph theoretical analysis, we assessed topological properties of weighted, undirected networks, focusing on global metrics (strength, clustering coefficient, efficiency) and nodal metrics (clustering coefficient, closeness centrality).

Results: Functional networks revealed significantly higher global metrics in both OSA and COMISA groups compared to controls, whereas structural networks showed a nonsignificant trend toward reduced global metrics in patient groups. Crucially, nodal analysis demonstrated that COMISA was distinguished from OSA by significantly higher connectivity (clustering coefficient and closeness centrality) localized to thalamostriatal circuits, including the bilateral thalamus, putamen, and right caudate. The degree of functional alteration correlated with the severity of insomnia and depressive symptoms.

Conclusion: COMISA is characterized by a unique functional network pattern of thalamostriatal dysregulation, distinct from OSA. These findings suggest that COMISA has a specific neurophysiological basis rooted in dysfunction of subcortical arousal and sleep-wake circuits, offering novel insights into its pathophysiology.

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0489

EVENT-RELATED AIRFLOW OBSTRUCTION IN OBSTRUCTIVE SLEEP APNEA IS ASSOCIATED WITH HYPERTENSION IN THE HISPANIC COMMUNITY HEALTH STUDY (HCHS/SOL)Raichel Alex¹, Daniela Sotres-Alvarez², Ali Azarbarzin³, Sharon Lutz⁴, Susan Redline¹, Scott Sands⁵¹Brigham and Women's Hospital, ²University of North Carolina at Chapel Hill, ³Harvard Medical School, ⁴Harvard Pilgrim Health Care Institute, ⁵Harvard University

Introduction: Obstructive sleep apnea (OSA) is a well-established risk factor for hypertension, but not all individuals with OSA have the same risk. We investigated whether specific features of

respiratory events—magnitude of ventilation reduction or airflow obstruction—can identify individuals at greatest risk for hypertension.

Methods: Nasal pressure from baseline in-home sleep apnea tests of Hispanic Community Health Study/Study of Latinos (HCHS/SOL) were used to derive two respiratory-event-related ventilation measures. Ventilation was estimated from square-root-transformed, integrated nasal pressure signal (tidal volume × respiratory rate) and was scaled 0–100% (0% = apnea, 100% = normal). Peak reduction in ventilation during respiratory events relative to baseline was then calculated using ensemble averaging. Additionally, airflow-shape analysis (100% = open airway, 0% = fully obstructed) was used to quantify changes in airflow obstruction during respiratory events relative to baseline. Logistic regression assessed associations of ventilation measures with hypertension defined by NHANES criteria at both a) baseline and b) follow-up (adjusting for baseline hypertension). Models were adjusted for age, sex, body mass index (BMI), Hispanic background, site, sampling weights, apnea-hypopnea index (AHI), and total sleep time.

Results: Sample included 12,073 participants (Age:47.4±13.2 years, BMI:29.9±5.9 kg/m², AHI:21.5±15.6 events/hr; follow-up: 6.04±0.79 years); 23.1% had hypertension at baseline and 30% at follow-up. At baseline, greater event-related reduction in ventilation was associated with prevalent hypertension (OR [95%CI]: 1.37[1.15–1.63] per 2 SD). Greater airflow obstruction showed an overall trend toward higher odds of hypertension (1.15[0.99–1.33], p=0.05) and was significant in participants with mild-to-no OSA (AHI < 15 events/hr; 1.56[1.17–2.10]; p-interaction=0.018). In contrast, greater event-related reduction in ventilation was not associated with hypertension at follow-up, whereas greater airflow obstruction was (1.24[1.06–1.46]); there was a trend toward higher odds in mild-to-no OSA (1.35[0.99–1.38], p=0.05). Additional adjustment for hypoxic burden modestly attenuated associations (< 13% coefficient change at baseline; < 2% at follow-up).

Conclusion: The magnitude of increase in airflow obstruction during respiratory events is associated with prevalent hypertension and the development of hypertension at follow-up. The degree of obstruction per se, beyond its downstream impact on ventilation and hypoxia, may be an important determinant of OSA-related hypertension risk.

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0490

LOOP GAIN AND AROUSAL THRESHOLD ASSOCIATION WITH NOCTURNAL BLOOD PRESSURE DYSREGULATION IN OSAJoy Wang¹, Abdelhamid Ghanem¹, Stavros Cardasis², Dylan Kissane², Jason Mateika³, Bharati Prasad¹¹University of Illinois Chicago, ²Wayne State University, ³Wayne State University School of Medicine

Introduction: Unstable ventilatory control from high loop gain and low arousal threshold are non-anatomical traits that predispose to sleep disordered breathing. In OSA, sympathetic response from respiratory events lead to blood pressure (BP) surges, nocturnal hypertension, and further BP dysregulation. We examined the association of loop gain and arousal threshold with average nocturnal BP during sleep, non-dipping BP, and respiratory event induced BP surge.

Methods: Data was collected from 60 adults with newly diagnosed moderate to severe OSA, of which data on 22 participants have been analyzed. Participants completed polysomnography with nocturnal beat to beat BP monitoring. Subsequently, loop gain, arousal threshold, average nocturnal BP, BP dipping, and BP surge in response to respiratory events were quantified. Age, sex, body mass index (BMI), and number of antihypertensives were recorded as covariates. The study was approved by the institutional review board (IRB). STATA v19.5 was used for data analysis.

Results: The mean age was 46.5 ± 9.5 years, average BMI 36.4 ± 6.9 kg/m², 12/22 were men, and 12/22 were on antihypertensive therapy. The apnea hypopnea index was in the severe OSA range (AHI3% 41.4 ± 36.9 /hour, average hypoxia burden was $91.4 \pm 112\%$). Higher loop gain was associated with non-dipping mean arterial BP (MAP, t-statistic=-2.72, p=0.01) and higher respiratory event induced MAP surge (t-statistic=3.35, p=0.004) but was not associated with average MAP during sleep. Higher arousal threshold was associated with higher average MAP during sleep (t-statistic=2.43, p=0.02), non-dipping MAP (t-statistic=-2.39, p=0.03), and respiratory event induced MAP surge (t-statistic=2.80, p=0.01).

Conclusion: This preliminary analysis demonstrates that key pathophysiological traits of high loop gain (increased chemosensitivity and downstream sympathetic activation) and high arousal threshold (possibly through longer, more severe respiratory events) are associated with nocturnal BP dysregulation in OSA. We plan to analyze the full dataset of 60 participants to confirm these findings and compare the association of nocturnal BP dysregulation to pathophysiological traits vs. AHI and hypoxia burden. These findings will provide novel mechanistic insights and potential biomarkers for OSA-induced hypertension.

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0491

NIGHT-TO-NIGHT VARIABILITY IN SURROGATES OF OBSTRUCTIVE SLEEP APNEA SEVERITY: MAIN AND SEX-SPECIFIC EFFECTS ON NEXT-DAY SYMPTOM PRESENTATION

Diego Mazzotti¹, Paul Scott², Faith Luyster³, Garret Funck², Meghan Fissore², Weiwen Wang², Sara Klein², Nick Pfeiff¹, Whitney Theis¹, Julia Walewicz¹, Pinar Garbioglu², Jonna Morris²

¹University of Kansas Medical Center, ²University of Pittsburgh,

³University of Pittsburgh School of Nursing

Introduction: Obstructive sleep apnea (OSA) is a heterogeneous disease with complex pathophysiology and varying symptom presentation. Yet, most of what we know about how the disease expresses is based on the results of a single sleep study and symptom questionnaires that summarize individuals' recent experience with OSA. Here, we leverage multi-night assessments of objective sleep parameters and daytime symptom presentation in individuals with OSA to assess associations between prior night's sleep parameters on next morning symptoms. We also assess whether these relationships are moderated by sex.

Methods: Individuals with untreated OSA (apnea hypopnea index [AHI] ≥ 5 events/h) were recruited from the community and invited to wear a cardiopulmonary coupling-based wearable ring for 15 consecutive nights, along with responding to ecological momentary assessments of daytime symptoms (sleepiness, fatigue, stress, mood and sleep quality). Associations between sleep parameters and next morning symptoms were assessed

using linear mixed-effects models controlled for age, body mass index categories and baseline Epworth sleepiness scale score. Models incorporating an interaction term with sex were also evaluated.

Results: A total of 1,074 nights from 86 participants (52.3% women; mean [SD] age 54.5 [15.5] years; mean [SD] diagnostic AHI 19.0 [18.3] events/h) were included. We observed significant associations between increased prior night sleep efficiency and improved next day sleepiness, fatigue, mood and sleep quality; increased sleep duration and lower stress and improved sleep quality; increased wake after sleep onset (WASO) and worse fatigue and mood; and greater mean pulse rate and worse fatigue, mood, and sleep quality. Suggestive sex-specific effects on the association between sleep latency and stress were also observed (interaction p=0.08). No associations between OSA severity surrogates (AHI, time below 90% saturation, mean event duration, oxygen saturation index) and next day symptoms were observed.

Conclusion: Cardiopulmonary coupling estimated sleep parameters such as sleep efficiency, sleep duration, WASO, and mean pulse rate were associated with variations in next morning symptom presentations, with sex-specific effects observed on sleep latency. The effect of other surrogates of OSA severity on symptoms remain unclear.

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0492

NONINVASIVE INTRACRANIAL PRESSURE MONITORING AND COGNITIVE CORRELATES IN OBSTRUCTIVE SLEEP APNEA

Karla Carlos, Douglas Soares, Davi Muniz, Ana Flávia Machado, Leticia Lambert, Lucas Martins, Rodrigo Leal, Carla Carletti, Gilmar do Prado

Escola Paulista de Medicina da Universidade Federal de São Paulo / EPM-UNIFESP

Introduction: Obstructive sleep apnea syndrome (OSA) is a common sleep-related disorder with many consequences, including changes in cerebral hemodynamics related to blood flow and intracranial pressure regulation caused by respiratory pauses. Among OSA's effects, cognitive changes are common, particularly in attention, processing speed, memory, and executive function. Our goal is to noninvasively assess intracranial pressure dynamics in adults with OSA and their potential link to cognitive impairment.

Methods: On the night of the Type I polysomnography, intracranial pressure (P2/P1 ratio) was assessed before and after sleep using a noninvasive monitoring device. Cognitive function was evaluated using the Montreal Cognitive Assessment (MoCA) and the Clock Drawing Test. Clinical and demographic characteristics were also collected, including age, sex, body mass index, and years of education. A paired t-test was used to compare mean P2/P1 ratios, and Cohen's d was calculated to estimate effect size. Associations between the P2/P1 ratio and cognitive test scores were examined using Spearman's correlation coefficient.

Results: Seven patients were included. The mean age was 54.9 ± 7.2 years, and 85.7% were women. The mean educational level was 13.4 ± 2.9 years, and the mean BMI was 33.1 ± 3.9 kg/m². We observed that before sleep onset, the P2/P1 ratio was already

elevated, becoming significantly higher in the early morning (1.31 ± 0.21 vs. 1.57 ± 0.26 ; $p = 0.0076$; Cohen's $d = 1.49$). The mean MoCA score was 23, whereas the expected score for this educational level was 26 or higher. The mean Clock Drawing Test score was 6 points (expected = 9). Analysis of the associations between the P2/P1 ratio and both the MoCA and Clock Drawing Test scores demonstrated a negative correlation.

Conclusion: Patients with OSA exhibited increased intracranial pressure even before sleep onset, which suggests a chronic alteration in cerebral compliance that further worsens after a night of sleep characterized by frequent obstructive events. Cognitive performance was slightly below the expected level for the participants' mean educational attainment, which may be explained by OSA itself or by the associated cerebral hemodynamic impairment.

Support (if any): National Council for Scientific and Technological Development (CNPq). Coordination for the Improvement of Higher Education Personnel (CAPES).

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0493

OBSTRUCTIVE SLEEP APNEA IN IDIOPATHIC PULMONARY FIBROSIS IS ASSOCIATED WITH REDUCED AROUSAL THRESHOLD AND PRESERVED UPPER AIRWAY COLLAPSIBILITY

Thomas Tolbert¹, Pavel Boulgakov¹, Barbara Morgan², Claudia Loppnow², Andrea Peterson², Braden Ellis², Daniel Morris², Isabella Marquetti², Luke Manietta², Indu Ayappa¹, David Rapoport¹, Mihaela Teodorescu²

¹David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai, ²Department of Medicine, University of Wisconsin School of Medicine and Public Health

Introduction: An increased prevalence of obstructive sleep apnea (OSA) has been observed among patients with idiopathic pulmonary fibrosis (IPF), fueling speculation of potential interactions between respiratory physiologic changes associated with IPF and the pathogenesis of OSA, including easier arousal by respiratory events. We conducted a matched case-control study to test the hypothesis that individuals with co-morbid IPF and OSA have lower arousal threshold than individuals with OSA alone.

Methods: We performed a secondary analysis of data collected from participants enrolled in the Role of Obstructive Sleep Apnea in Modulating the Cardio-Pulmonary Responses to Antifibrotics (OSA/IPF), a study of adult subjects with an established diagnosis of IPF on a stable dose of antifibrotic medication (nintedanib or pirfenidone). Participants underwent attended in-lab attended polysomnography (PSG). OSA/IPF participants were matched to historical controls who previously underwent in-lab PSG as part of other OSA research studies. All PSG studies were scored according to American Academy of Sleep Medicine recommendations. OSA endotypes were derived by Phenotyping Using Polysomnography (PUP) analysis and include upper airway collapsibility (Vpassive), arousal threshold (ArTH), loop gain (LG1), and upper airway muscular response (Vcomp).

Results: Thirteen participants in OSA/IPF (age 71.1 ± 7.8 years, 10 males, BMI 27.7 ± 4.8 kg/m², AHI3A 29.7 ± 15.2) had acceptable pneumotachygraphy or nasal cannula airflow signals and an AHI3A of at least 10 events/hour, and were age-, sex-, and BMI-matched with 13 historical controls (age 67.5 ± 6.9 years, 10 males, BMI 28.8 ± 5.6 kg/m²), who incidentally had similar OSA

severity (AHI3A 27.2 ± 12.5 events/hr, p for difference = 0.687). ArTH was lower in OSA/IPF (108.5 ± 9.1 %Veupnea) compared to controls (140.6 ± 71.3 %Veupnea, $p = 0.022$). Vpassive was higher in OSA/IPF (95.3 ± 5.4 %Veupnea) than controls (79.5 ± 30.3 %Veupnea, $p = 0.016$). LG1 was similar across groups (0.65 ± 0.16 versus 0.60 ± 0.23 , $p = 0.801$). Vcomp was higher among OSA/IPF (3.8 ± 12.6 %Veupnea) than controls (-6.6 ± 22.5 %Veupnea), but the difference was not significant ($p = 0.064$).

Conclusion: In comparison to OSA in the absence of established cardiopulmonary disease, OSA in the setting of IPF is characterized by easier arousal due to respiratory events and less collapsibility of the upper airway.

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0494

OBSTRUCTIVE SLEEP APNEA IS ASSOCIATED WITH SYMPATHETIC OVERACTIVATION AND HYPERTENSION: AGE EFFECT

Baixin Chen¹, Alexandros Vgontzas², Yun Li³

¹Shantou University, ²Penn State College of Medicine, ³Shantou University Mental Health Center

Introduction: The association between obstructive sleep apnea (OSA) and hypertension has been noted to be stronger in young and middle-aged than older adults. Since the sympathetic overactivation is a known mechanism of hypertension, we hypothesized that the association between OSA and sympathetic overactivation was moderated by age.

Methods: We recruited 166 consecutive patients with OSA from the sleep clinic of Shantou University Medical College. OSA was defined as an apnea-hypopnea index (AHI) ≥ 5 events/hour based on an overnight polysomnography. AHI and time under 90% oxygen (T90) were used to assess the severity of OSA and hypoxic burden. Twenty-four-hour urinary norepinephrine was used for assessing sympathetic activity. Blood pressure was averaged from morning and evening measurements. The older adults were defined as age > 50 years (the 75th percentile of the overall subjects).

Results: Among the 166 OSA patients, each 10-event/hour increase in AHI and 1-hour increase in T90 were associated with $1.63\text{-}\mu\text{g}$ ($p=0.087$) and $4.76\text{-}\mu\text{g}$ ($p < 0.001$) increase in 24-hour urinary norepinephrine respectively after controlling for potential confounders. Furthermore, we found each 10-event/hour increase in AHI and 1-hour increase in T90 were associated with $2.59\text{-}\mu\text{g}$ (95%CI= $0.43\sim 4.75$, $\beta=0.22$, $p=0.019$, interaction- $p=0.075$) and $6.36\text{-}\mu\text{g}$ (95%CI= $3.41\sim 9.31$, $\beta=0.37$, $p < 0.001$, interaction- $p=0.017$) increase in 24-hour urinary norepinephrine respectively among the young and middle-aged OSA patients, but not in the older patients ($p=0.187$ and 0.791). Similarly, either AHI or T90 was associated with higher blood pressure among young and middle-aged (all $p < 0.001$), but not in older patients (all $p \geq 0.233$). These associations were mediated by the levels of 24-hour urinary norepinephrine with mediation effect of $7.67\sim 13.41\%$ only among the young and middle-aged OSA patients.

Conclusion: OSA is associated with higher sympathetic activity and blood pressure in young and middle-aged, but not in older adults. Early prevention and intervention for OSA is essential to improve cardiovascular outcomes.

Support (if any):

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0495

SEX-SPECIFIC DELTA HEART RATE VARIATION ACROSS AGE AND BMI IN OBSTRUCTIVE SLEEP APNEA AMONG HISPANIC/LATINO INDIVIDUALSGonzalo Labarca¹, Joaquin Nieto-Pino², Daniel Solomons¹, Mario Henriquez-Beltran³, Eva Retamal-Riquelme⁴, Arthur Eumann-Mesa², Diana Pozuelo-Carrascosa²¹Pontificia Universidad Católica de Chile, ²Universidad Castilla-La Mancha, ³Universidad Adventista de Chillan, ⁴Hospital La Florida

Introduction: Introduction: Delta Heart Rate (Δ HR) reflects autonomic changes during respiratory events and may provide complementary physiological information beyond traditional obstructive sleep apnea (OSA) metrics. We examined sex-specific patterns of Δ HR and its associations with event frequency, age, and Body Mass Index (BMI) -defined strata.

Methods: Methods: We analyzed 913 adults (463 women). Δ HR was defined as the difference between the maximum pulse rate within a subject-specific search window spanning from a pre-event minimum to a post-event minimum and the minimum pulse rate during apneas or hypopneas, emphasizing ensemble-averaged, time-averaged changes over 10–30 seconds. OSA severity was assessed using the apnea-hypopnea index (AHI), oxygen desaturation index (ODI), and percentage of sleep time with $\text{SpO}_2 < 90\%$ (CT90). Group comparisons used t-tests and chi-square tests. Associations between age, BMI categories, and severity metrics were examined through sex-stratified linear models.

Results: Results: Mean age was 55.3 ± 13.1 years and BMI 35.6 ± 8.4 kg/m². Men showed higher AHI (40.5 ± 28.4 vs. 29.0 ± 26.8 events/h), ODI (40.4 ± 27.7 vs. 30.7 ± 27.3 events/h), CT90 ($35.4 \pm 30.8\%$ vs. $31.9 \pm 32.4\%$), and Δ HR (5.54 ± 2.93 vs. 4.18 ± 1.97 bpm) compared with women (all $p < 0.001$). Δ HR varied across age and BMI strata in both sexes. In women, Δ HR showed a graded decline with age (β for 45–59 = -0.34 ; β for ≥ 60 = -1.10 ; $p < 0.001$ for trend), while AHI, CT90 and ODI increased across age and BMI categories. In men, Δ HR also decreased with age (β for 45–59 = -0.80 ; β for ≥ 60 = -1.50 ; $p < 0.001$ for trend) and increased among those with BMI ≥ 40 (β = $+1.79$; $p = 0.001$).

Conclusion: Conclusion: Δ HR displays distinct sex-specific patterns, characterized by an age-related decline in both sexes and a BMI-related increase restricted to men. Δ HR provides complementary physiological information that enhances the characterization of autonomic responses to respiratory events. These findings support incorporating Δ HR alongside traditional metrics in population-level assessments.

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0496

SLEEP-DISORDERED BREATHING, SLEEP DURATION, AND 24-HOUR AMBULATORY BLOOD PRESSURE IN SELF-PERCEIVED SHORT-SLEEPING ADULTSJoshua Landvatter¹, Kendal Chatard¹, Adam Bress¹, Jennifer Duffecy², Sara Simonsen¹, Chelsea Allen¹, Kelly Baron¹¹University of Utah, ²University of Illinois at Chicago

Introduction: Obstructive sleep apnea (OSA) and short sleep duration each contribute to hypertension risk, yet their combined

influence on 24-hour blood pressure patterns is not well characterized. This study evaluated associations between apnea-hypopnea index (AHI), objective sleep duration, and ambulatory blood pressure (ABP), and tested whether sleep duration modifies relationships between AHI and nocturnal dipping among adults with elevated in-office blood pressure.

Methods: This cross-sectional analysis used baseline data from a behavioral sleep extension trial. Adults aged 18–65 years were eligible if they reported habitual sleep < 7 hours and had elevated in-office blood pressure (systolic 120–140 mmHg or diastolic 80–90 mmHg). Objective sleep was measured for seven days with a wrist-worn actigraphy device. OSA severity was assessed using a single-night home sleep apnea test generating AHI values. Participants completed 24-hour ABP monitoring, with daytime and nighttime windows aligned to actigraphy-defined rest periods. Linear regression models tested associations between AHI and mean systolic and diastolic blood pressure. Logistic models examined associations between AHI and systolic and diastolic non-dipping ($< 10\%$ nocturnal reduction). Moderation by total sleep time was evaluated with interaction terms. Adjusted models included age, sex, race, and body mass index.

Results: A total of 195 participants had valid actigraphy, AHI data, and ambulatory blood pressure data with a mean age of 42 ± 11 years. AHI was not associated with mean systolic blood pressure in unadjusted or adjusted models. Higher AHI was associated with higher mean diastolic blood pressure in unadjusted ($p = 0.013$) and adjusted ($p = 0.045$) models. AHI predicted systolic non-dipping in unadjusted analyses ($p = 0.049$), with a marginal effect after adjustment ($p = 0.090$). AHI was not associated with diastolic non-dipping. Sleep duration did not moderate AHI associations with mean blood pressure but longer sleep significantly attenuated the AHI-systolic non-dipping relationship ($p = 0.045$).

Conclusion: Among adults with elevated in-office blood pressure and short sleep duration, greater OSA severity predicted higher mean diastolic blood pressure and increased systolic non-dipping, with longer sleep time weakening the influence of AHI on nocturnal systolic dipping.

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0497

THE CENTRAL ROLE OF THE BRAINSTEM IN UPPER AIRWAY SLEEP HEALTHKingman Strohl¹, Denise Dewald², Eriko Hamada³, Susheel Patil⁴¹University Hospitals Cleveland Medical Center, ²Division of Pulmonary, Critical Care and Sleep Medicine, MetroHealth Medical Center, ³Division of Pulmonary, Critical Care, and Sleep Medicine, University Hospitals, Case Western Reserve University, ⁴University Hospitals of Cleveland

Introduction: The thesis is inspired by supporting evidence from evolution, physiology, and clinical studies. “Upper airway sleep health” is keeping the airway open enough to not disturb sleep too much. Losing this ability leads to obstructive sleep apnea (OSA).

Methods: Premise 1: What element drives upper airway functions during sleep? Premise 2: Is brainstem function the critical organ in the development of OSA?

Results: 1. The challenge starts with first breaths, and the cycle of breathing, sucking, and swallowing. As the interface between the environment and the lungs, its healthy functions adapt to posture, sleep state, growth and aging, and be resilient to stresses (allostasis), like an URI. Clinical examples of recovery are that

~50% of children with enlarged lymphoid tissue and disordered breathing resolve over time with “watchful waiting”; and, when weight loss in obesity addresses the mass and metabolic allostatic loading, sleep disordered breathing improves and may resolve. 2. In vertebrates, the brainstem is the breathing controller in a feedback system assessing successes of coordinated muscle activation informed by neural feedback. We propose that brainstem adaptability and resiliency are degraded in individuals progressively leading to OSA presentations. Allostatic features are common in pediatric and adult presentations, including gender, age, and craniofacial risks and co-morbidities like hypertension, cardiovascular disease, obesity and smoking; socioeconomic conditions producing psychologic factors; and genetic predispositions. After a latent phase, accumulated effects in those susceptible eventually leads to upper airway instability (allostatic overload) leading to OSA presentation, its individual phenotypes and endotypes.

Conclusion: Upper airway patency during sleep is resilient and when challenged by anatomic, neural, metabolic, and developmental factors, can generally adapt successfully. OSA in its various presentations has a latent phase in which chronic stressors produce a chronically unstable condition during sleep (allostatic overload), eventually expressed as clinical illness and the need for management. The task is to measure and detect predispositions to adult- and childhood-onset sleep disordered breathing early enough to initiate primary or secondary prevention to preserve healthy feedback control.

Support (if any): Division of Pulmonary, Critical Care and Sleep Medicine, University Hospitals Cleveland OH

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0498

THE PERIODIC LIMB MOVEMENT DURING SLEEP RELATED VENTILATORY PATTERN

Brian Koo¹, Nilanjan Banerjee², Fahad Siddiqui², Hung Mo Lin¹, Emily Rivera¹, Andrew Minagar¹, Scott Sands³, Andrey Zinchuk¹

¹Yale University, ²University of Maryland Baltimore County, ³Harvard University

Introduction: Periodic limb movements during sleep (PLMS) are associated with repeated arousals and heart rate increases, suggesting sympathetic nervous system activation that could alter ventilation.

Methods: This retrospective, observational study evaluated breath-by-breath ventilation surrounding PLMS. NREM sleep epochs from polysomnograms with PLMS index (PLMI) ≥ 15 were analyzed. Validated signal processing algorithms analyzed EEG, leg EMG and nasal pressure data to identify PLMS, arousals, apneas, hypopneas and breath-by-breath ventilation. Ventilation (Vn) per breath was measured by integrating a square-root transformed nasal pressure signal over the breath's duration, multiplying by respiratory rate and normalizing by 7-minute mean ventilation (baseVn). Vn=1.0 indicates 'normal' breathing; values above and below 1.0 indicate hyper- and hypoventilation. Each PLMS has an associated unique breath sequence: 6 breaths before (6B-1B), 1-2 breaths during (1D-2D), 8 breaths after (1A-8A) PLMS. Arousal was associated with PLMS when overlapping with 0.5 seconds before and after PLMS. Apnea or hypopnea were related to PLMS when overlapping with PLMS or breaths 1A-4A (PLMS-AH). PLMS-AH divided by hours NREM sleep (PLMS-AHI) ≥ 5 defined PLMS-related OSA (PLMS-rOSA).

Results: Seventy individuals (25 women) were 62.3 ± 15.4 years old with BMI 32.5 ± 8.4 kg/m², median PLMI 73.3 and median AHI 14.8.

11 individuals had AHI < 5; 59 had AHI ≥ 5 . In total, there were 27,743 PLMS, 4,129 hypopneas and 2,679 apneas. 67.3% of apneas and hypopneas were PLMS-AH. 16.5% of PLMS were PLMS-AH; 31.9% for severe OSA. Median PLMS-AHI was 12.5. 78.6% of the cohort and 92.3% of OSA sufferers had PLMS-rOSA. Ventilation increased during PLMS and decreased following PLMS. For PLMS without arousal, Vn (medians) rose during PLMS to 1.07 (1D) and 1.05 (2D), while Vn fell after PLMS to a 0.91 nadir (4A). 1D-2D were significantly greater, while 2A-7A were significantly less than baseVn. For PLMS with arousal, Vn (medians) increased during PLMS to 1.35 (1D) and 1.40 (2D), and Vn fell to a 0.80 nadir (4A). 1D-2D and 1A were significantly greater, while 3A-8A were significantly less than baseVn. 39.6% of 4A breaths had Vn < 0.7.

Conclusion: Ventilation increased during PLMS and decreased following PLMS with larger magnitudes for PLMS with arousal. PLMS-rOSA was highly prevalent.

Support (if any):

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0499

THE RELATIONSHIP BETWEEN TONGUE FORCE, OSA AND UPPER AIRWAY ANATOMY, ASSESSED BY MRI

Nathan Nowalk¹, Brendan Keenan¹, Bruno Saconi², Andrew Wiemken¹, Bryndis Benediktsdottir³, Thorarinn Gislason³, Allan Pack¹, Richard Schwab⁴

¹University of Pennsylvania, ²Penn Medicine, ³University of Iceland, ⁴University of Pennsylvania Perelman School of Medicine

Introduction: The pathogenesis of obstructive sleep apnea (OSA) is multifactorial and likely involves reduced activation of upper airway (UA) dilator muscles during sleep. The genioglossus, the primary tongue protruder, contracts with each inspiration to prevent posterior tongue collapse and maintain airway patency. Several OSA therapies target tongue musculature; however, the impact of tongue protrusion strength on OSA severity remains poorly defined. Prior studies examining this relationship lacked comprehensive characterization of UA anatomy, overlooking key structural confounders. Our study aimed to define the relationship between tongue protrusion strength and OSA severity while accounting for tongue volume and fat, as quantified by magnetic resonance imaging (MRI).

Methods: The sample included 219 participants from the EXPO study, a multicenter, international, case-control study of adults with moderate-to-severe OSA (apnea-hypopnea index [AHI] > 15 events/hr) and controls (AHI < 15). Tongue protrusion strength was derived from the mean of four maximal isometric pressure trials with a pressure transducer. UA anatomy was quantified by MRI, including genioglossus volume, total tongue volume, and fat percentage of tongue. Tongue force measurements were compared between apneics and controls using Pearson correlations (unadjusted) and linear regression adjusted for age, gender, BMI, race, and site.

Results: Participants were predominantly male (59.4%) with mean age 51.4 years, BMI 30.5 kg/m², and AHI 22.9 events/hour (135 apneics, 84 controls). Maximal tongue force was not associated with OSA status or severity, in either adjusted or unadjusted analyses. Similarly, in both unadjusted and adjusted analyses, maximal tongue force was not correlated with genioglossus volume, total tongue volume, or tongue fat percentage. Comparisons between apneics and controls showed no significant correlations

between maximal tongue force and any of the three anatomic tongue metrics, regardless of adjustment.

Conclusion: This study is the first to use quantitative MRI of the UA to examine the relationship between tongue strength and OSA severity. Overall, our results indicate that maximal tongue force alone does not explain OSA severity. These findings underscore the importance of considering that tongue strength also includes fatiguability, which may contribute to OSA pathogenesis and inform the development of targeted therapies.

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0500

UNDERSTANDING CONTRIBUTIONS OF UPPER AIRWAY ANATOMY TO OSA RISK IN LEAN AND OBESE PATIENTS: RESULTS FROM THE EXPO STUDY

Bruno Saconi¹, Brendan Keenan¹, Andrew Wiemken¹, Nathan Nowalk¹, Bryndis Benediktsdottir², Thorarinn Gislason², Allan Pack¹, Richard Schwab³

¹University of Pennsylvania, ²University of Iceland, ³University of Pennsylvania Perelman School of Medicine

Introduction: Obstructive sleep apnea (OSA) is strongly influenced by upper-airway anatomy, with increased soft tissue size thought to be particularly important in obese patients and craniofacial restriction thought to be more important in lean patients. However, obesity alone do not fully explain disease susceptibility: many obese individuals remain unaffected and lean individuals without craniofacial restriction can develop OSA. The present study, Mechanisms of Extreme Phenotypes in OSA (EXPO), compared lean and obese individuals with and without OSA to identify anatomical characteristics that may confer risk in lean patients and protection in obese individuals.

Methods: Adults ≥ 18 years-old were enrolled from the University of Pennsylvania and University of Iceland and classified into one of four groups: lean OSA ($AHI \geq 15$ events/hour; $BMI \leq 27.5$ kg/m²), lean controls ($AHI \leq 5$; $BMI \leq 27.5$ kg/m²), obese OSA ($AHI \geq 15$; $BMI \geq 32.5$ kg/m²), and obese controls ($AHI \leq 5$; $BMI \geq 32.5$ kg/m²). All participants underwent standardized magnetic resonance imaging (MRI) of the upper airway to quantify soft-tissue volumes and craniofacial dimensions. Anatomical differences across groups were evaluated using analysis of covariance adjusting for age, sex, race, and site, following by comparisons between apneics and controls within BMI strata.

Results: The study sample included 263 participants (64 lean apneics, 64 lean controls, 94 obese apneics, 41 obese controls). Among lean participants, apneics had a smaller retropalatal airway and greater tongue fat and pharyngeal fat pads than controls, suggesting increased upper airway fat deposition increases OSA risk even without general obesity. Among obese participants, controls demonstrated a larger retropalatal airway and smaller lateral pharyngeal wall and tongue volumes than obese apneics, as well as less craniofacial restriction, suggesting a more favorable soft-tissue to craniofacial ratio protects from OSA despite obesity.

Conclusion: Soft tissue and craniofacial anatomy contribute to OSA risk in both lean and obese individuals, which can inform personalized medicine approaches. In obese individuals, less retrogathia and smaller pharyngeal soft tissues protect against OSA, consistent with weight loss being effective in these patients.

In lean individuals, localized soft tissue enlargement (including tongue fat) increases OSA risk, suggesting that use of weight-loss medications targeting soft-tissue reduction may also be effective in lean patients.

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0501

WORSE LEFT VENTRICULAR DIASTOLIC DYSFUNCTION IS NOT ASSOCIATED WITH GREATER VENTILATORY CONTROL INSTABILITY IN OBSTRUCTIVE SLEEP APNEA

Thomas Tolbert¹, Daphne Valencia¹, Eriko Hamada², Wenli Zhao³, Stamatios Lerakis³, Ashish Correa³, Sumeet Mitter⁴, Nancy Redeker⁵, Indu Ayappa¹, David Rapoport¹

¹David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai, ²Division of Pulmonary, Critical Care, and Sleep Medicine, University Hospitals, Case Western Reserve University, ³Division of Cardiology, Department of Medicine, Icahn School of Medicine at Mount Sinai, ⁴Inova Schar Heart and Vascular, ⁵Elisabeth DeLuca School of Nursing, University of Connecticut

Introduction: Systolic dysfunction of the left ventricle may contribute to the pathogenesis of obstructive sleep apnea (OSA) by destabilizing ventilatory control. However, the role of left ventricular diastolic dysfunction (LVDD) in OSA pathogenesis is relatively underexplored. We hypothesized that worse LVDD would be associated with greater ventilatory control instability (higher loop gain).

Methods: We prospectively recruited adult patients with 1) known untreated OSA or suspected OSA given snoring and/or daytime sleepiness and 2) known LVDD or at risk for LVDD given age ≥ 55 years or the presence of obesity, hypertension, or diabetes. Recruited participants underwent in-lab polysomnography (PSG) and transthoracic echocardiography (TTE) with measurement of diastolic parameters. PSGs were scored according to American Academy of Sleep Medicine recommendations. OSA endotypes were estimated with Phenotyping Using Polysomnography (PUP) and included loop gain (LG1), collapsibility (V_{passive} and V_{min}), arousal threshold (ArTH), and muscular compensation (V_{comp}).

Results: Of 32 participants who consented to the study, 21 (14 male) completed PSG and TTE and were aged 58.7 ± 10.3 years, with body mass index 33.6 ± 6.3 kg/m², and AHI_{3A} 29 ± 16.6 events/hr. LG1 was not correlated with markers of LVDD, including left atrial volume index (LAVI) or E/e' ($R = 0.21$, $p = 0.37$ and $R = -0.15$, $p = 0.51$, respectively). Neither did LG1 increase with increased LVDD grade (Kruskal-Wallis $p = 0.71$) or in the presence of elevated left atrial pressure (LAP) by lateral $E/e' > 12$ (Wilcoxon $p = 0.25$). Secondary, exploratory analyses suggested that rising E/e' is associated with increasing V_{min} ($R = 0.39$, $p = 0.079$) and decreasing ArTH ($R = -0.41$, $p = 0.068$), though correlations were not statistically significant. Elevated LAP was associated with increased V_{min} (57 ± 28 vs 33.6 ± 25.4 % V_{eupnea} , $p = 0.029$). Elevated LAP was also associated with lower ArTH, but the difference was not statistically significant (124.3 ± 30.6 vs 152.3 ± 44.4 % V_{eupnea} , $p = 0.110$).

Conclusion: Greater LVDD by left atrial size or pressure elevation according to TTE indices was not significantly associated with greater ventilatory control instability by PUP-estimated LG1.

However, LAP elevation may be associated with easier arousal from sleep and relatively preserved upper airway collapsibility.

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0502

INFRARED IMAGING OF FACE BLOOD FLOW IN RESPONSE TO CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) IN OBSTRUCTIVE SLEEP APNEA (OSA)

Srinivasan Govindan¹, Megan Govindan²

¹Wheeling Hospital, WVU Medicine, ²West Virginia University, Institute for Community & Rural Health

Introduction: Face infrared images taken after CPAP demonstrates vasomotor response. Face blood vessels have baroreceptors. BRS (baroreceptor sensitivity) testing involves vasomotor reactivity (VMR) related changes. In 2022, it was reported that BRS [tested at ambient pressure (1 atm)] in OSA patients was not reduced during rest. We reviewed our data to see whether face VMR to CPAP (at 1 atm), while at rest was altered in sleep apnea patients using CPAP compared to controls.

Methods: The protocol was approved by the hospital committee for the protection of human subjects. Exclusion criteria: age < 18 years, pregnancy, head-injury, untreated hypertension/ cardiac disease, diabetes, COPD, hyperlipidemia, h/o drugs use, cannabis products, smoking/vaping, chemotherapy and untreated sleep disorder. AGA Model 782, AGEMA and FLIR A40 Cameras were used for daytime testing. Participants were awake/seated for imaging. Six Caucasians, ages 33-58 yrs (mean 45.5 yrs), three males and three females; four on CPAP treatment for OSA (moderate/severe) and two were non-sleep apnea controls. Before imaging, participants equilibrated for 20 minutes in a temperature, humidity, and air flow controlled and monitored laboratory. CPAP, tcpO₂ and EtCO₂ were monitored. CPAP 10-15 cm for 15 minutes. Pre-post CPAP images were done.

Results: A change in facial temperature of 0.5°C is clinically significant. Patients and controls both showed a face temperature decrease of 0.5°C or more, [i.e., CPAP closed extracranial face blood flow-AVAs shunts (vasoconstriction)] in both groups]. The pre-post CPAP temperature decrease was more in sleep apnea patients compared to control, indicating altered VMR in sleep apnea patients at rest.

Conclusion: Pre- and post-CPAP temperature differences reflected changes in the participants' physiological vasomotor state. CPAP induced changes in the tcpO₂ and EtCO₂ were not enough to explain VMR changes. Clinically sleep apnea patients are symptomatic in ambient atmospheric pressure. Changing the airway pressure by 1 atm + CPAP pressure ameliorates the sleep apnea. CPAP 10 cm is roughly 1% (just under 1 percent) of 1 atm at sea level. This minimal pressure change resulted in vasoconstriction of AVAs and capillary recruitment. This was imaged by thermography. Infrared technology can image face (extracranial) VMR at rest in OSA.

Support (if any): Nothing to disclose.

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0503

PHYSIOLOGIC BURDENS OF SLEEP APNEA AND RISK OF PARKINSON'S DISEASE IN A CLINICAL COHORT OF OVER 4000 PATIENTS

Yi Fang¹, Alice Albrecht¹, Haoqi Sun², Sasha Milton¹, Ankit Parekh³, David Rapoport⁴, M. Brandon Westover², Yue Leng¹

¹University of California, San Francisco, ²Beth Israel Deaconess Medical Center, ³Icahn School of Medicine at Mount Sinai, ⁴David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Obstructive sleep apnea has been associated with increased risk of Parkinson's disease (PD), yet findings remain inconsistent. Preclinical studies suggest hypoxia may have protective effects on PD, and higher apnea-hypopnea index (AHI) appeared protective in our recent work. To clarify underlying mechanisms, we examined how distinct physiologic burdens of sleep apnea, including hypoxic burden (HB), ventilatory burden (VB), and arousal burden (AB), relate to subsequent PD risk.

Methods: We examined adults ≥50 years who underwent in-laboratory polysomnography (PSG) at Massachusetts General Hospital (2010–2020) from the Human Sleep Project, excluding those with supplemental oxygen or pre-existing PD. Incident PD was defined as ≥2 PD ICD codes, ≥2 PD-related medication use, and no exclusionary neurological diseases. HB quantified cumulative oxygen desaturation area divided by total sleep time; VB quantified the proportion of breaths < 50% normalized amplitude; AB quantified total arousal duration relative to total sleep time. Associations with PD risk were estimated using Cox regression, adjusting for demographics, body mass index, smoking, cardiovascular and pulmonary comorbidities, REM sleep behavior disorder, and sleep medication. Additional analyses assessed each burden separately during REM and NREM sleep. Secondary analyses further adjusted for AHI and accounted for competing risk of death.

Results: Among 4,100 individuals (age 62.3 ± 8.7 years, 52.7% female, 24.2% non-White) followed for 9.8 ± 3.3 years, 100 (2.4%) developed PD. Higher HB was associated with lower PD risk (Q2 HR=0.350, 95% CI: 0.181–0.675, P=0.003; Q3 HR=0.357, 95% CI: 0.191–0.669, P=0.002; Q4 HR=0.571, 95% CI: 0.332–0.982, P=0.046; all reference: Q1). Higher AB was also associated with lower PD risk (Q3 HR=0.526, 95% CI: 0.294–0.940, P=0.033; Q4 HR=0.497, 95% CI: 0.280–0.883, P=0.020). VB showed no significant association. Notably, HB and AB during REM, but not NREM, were associated with lower risks. Findings remained robust with secondary analyses.

Conclusion: Among >4000 patients who underwent in-lab PSG, higher hypoxic and arousal burdens were associated with lower risks of PD, potentially reflecting neuroprotective hypoxic preconditioning or altered sleep propensity due to degeneration of wake-promoting neurons in prodromal PD. Future studies should clarify the complex sleep apnea-PD relationship and delineate apnea phenotypes that map onto distinct physiological pathways.

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0504

NEURAL BASIS OF IMPROVED SUSTAINED ATTENTION FOLLOWING SLEEP APNEA TREATMENTDishari Azad¹, Daphne Valencia², Sara Hishinuma¹, Sajila Wickramaratne¹, Korey Kam¹, Lazar Fleisher¹, Andrew Varga¹, Indu Ayappa², David Rapoport², Ankit Parekh¹¹Icahn School of Medicine at Mount Sinai, ²David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Obstructive sleep apnea (OSA) is associated with sustained attention deficits and lapses in vigilance. Although OSA treatment via continuous positive airway pressure (CPAP) is thought to normalize these attentional deficits, the normalization of presumed neural dysfunction is not yet understood. Here we sought to assess the neural underpinnings of sustained attention improvements associated with CPAP. Given the role of thalamus in attention regulation, we hypothesized that thalamic activity will be positively associated with attention/vigilance.

Methods: Twenty adults with OSA (13M/7F, Age:57±10, BMI:33±7) who were adherent to AutoPAP (≥4 hr/night for ≥70% of nights) completed polysomnograms (on-CPAP, off-CPAP; counterbalanced). The following morning, participants performed a psychomotor vigilance task (PVT) during fMRI. Lapses are defined as reaction time (RT)≥500ms, and participants are categorized as attentive (< 7.1 lapses) or nonattentive (>7.1 lapses) by median split. Functional MRI is preprocessed by AFNI using a general linear model and group-level mixed-effects analysis to identify thalamic activity in (1) on-CPAP vs. off-CPAP (2) attentive vs. nonattentive on-CPAP and (3) an exploratory moderation by anxiety (N=6). Significant clusters were ≥20 voxels (3D units).

Results: Two thalamic clusters (contiguous voxel group) showed higher activity on-CPAP compared to off-CPAP: a left-thalamic cluster (57 voxels; CM = -7.1, 19.7, 6.1 [center-of-mass coordinates]; mean beta estimate = 0.145) and a right-thalamic cluster (39 voxels; CM = 10.8, 12.2, 5.3; mean = 0.146). The attentive-nonattentive analysis identifies two left-thalamic clusters (51 and 29 voxels; means = -0.193 and -0.1652), suggesting lower activation in high-lapse subjects. PVT performance shows a trend of fewer lapses on-CPAP, and more lapses in the nonattentive group. An exploratory analysis reveals three additional thalamic clusters (326, 124, and 50 voxels; means = 0.18, 0.16, 0.14) in which anxious subjects demonstrate larger on-off activation differences compared with non-anxious subjects.

Conclusion: Our findings suggest that thalamic activity may differ across treatment and attentional performance, where patients with good vigilance show stronger thalamic engagement. Patterns observed within anxious subjects suggest that some subgroups may be more sensitive to changes in treatment. These findings identify the thalamus as a key region for investigating variability in treated OSA patients.

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0505

NEUROPHYSIOLOGIC MARKERS OF NON-RESTORATIVE SLEEP IN CPAP-TREATED OBSTRUCTIVE SLEEP APNEA: AN AMBULATORY SLEEP EEG STUDY

Indurashmi Mayakrishnan, Arshini Suresh, Sharanya Vunnavu, Laya Ragunathan

Texas Institute for Neurological Disorders

Introduction: A proportion of obstructive sleep apnea patients report persistent non-restorative sleep (NRS) despite effective CPAP therapy with adequate compliance and treatment efficacy. This suggests that factors including sleep architecture disturbances, cortical arousals, and autonomic activation contribute to impaired sleep quality. Using ambulatory sleep EEG technology, this study aims to identify neurophysiological predictors of NRS in CPAP-compliant adults aged 45 years and above. Characterizing these EEG-based biomarkers could enhance risk stratification, guide targeted interventions, and inform adjunctive therapies to optimize sleep quality outcomes beyond respiratory normalization alone.

Methods: This retrospective observational pilot study analyzed ambulatory sleep EEG data and CPAP compliance reports from 21 patients (n=21; 15 male, 6 female; age ≥45 years) with obstructive sleep apnea. Eligible participants demonstrated adequate CPAP compliance (≥80% nightly usage, ≥70% nights with ≥6 hours use) and treatment efficacy. Sleep architecture parameters, including N3 and REM sleep percentages, cortical arousals per hour, and autonomic activation values, were referenced against mean normative data for age/sex-specific categories from Walsleben et al. (2004) to identify deviations associated with non-restorative sleep.

Results: Using one-sample t-tests comparing patient values to age- and sex-adjusted normative means, patients demonstrated reduced N3 sleep (61.9% below norm; $t = -0.91$, $p = .37$) and reduced REM sleep (57.1% below norm; $t = -1.93$, $p = .07$). Cortical arousal index was elevated, with 85.7% above normative expectations ($t = -3.30$, $p = .004$). Autonomic activations exceeded normative cutoff (11.4) in 76.2% of patients and were significantly elevated in the 55–69 and 70–91 groups ($t = -2.65$, $p = .045$; $t = -3.45$, $p = .007$). Findings suggest physiologic hyperarousal despite CPAP treatment.

Conclusion: CPAP-treated patients with persistent non-restorative sleep demonstrated reduced N3 and REM sleep, elevated cortical arousal burden, and marked autonomic hyperarousal—with over three-quarters exceeding normative reference values—indicating sleep fragmentation. These physiologic patterns suggest identifiable EEG/autonomic signatures of NRS in treated OSA, characterized by inadequate slow-wave/REM expression and increased central arousal. Further research using larger samples is needed to validate these markers and evaluate whether interventions targeting sleep continuity and arousal regulation can improve outcomes in this patient phenotype.

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0506

CIRCUIT REBREATHING DURING CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) THERAPY

Ludovico Messineo¹, natalie Lawrence², Dillon Gilbertson², Daniel Vena², Joao Luiz Gomes Carneiro Monteiro², Ali Azarbarzin¹, Neda Esmaeili², Andrew Wellman³, William Noah⁴, David White¹, Scott Sands²

¹Harvard Medical School, ²Brigham and Women's Hospital, ³Harvard, Brigham and Women's Hospital, ⁴Sleep Centers of Middle Tennessee

Introduction: Obstructive sleep apnea (OSA) first-line therapy, continuous positive airway pressure (CPAP), is highly efficacious but limited by adherence. We propose that an underrecognized factor influencing adherence is circuit rebreathing. The current study sought to carefully quantify levels of rebreathing under various exhaust flow conditions.

Methods: 13 participants with moderate-to-severe OSA performed wakefulness testing while breathing on a modified CPAP circuit that allowed independent manipulation of exhaust flow. Exhaust flow levels of 8, 13, 18, 23, and 35 L/min were studied. Patients breathed on the circuit at 5 cmH₂O for 1-2 min for each exhaust flow level, repeated in duplicate. We also assess effects of lowered exhaust flow on the global breathing discomfort scale. Mean inspired CO₂ and inspired O₂ levels were carefully estimated using delay-corrected gas sampling. Effects of circuit exhaust on inspired CO₂ and inspired O₂ were assessed using mixed model analysis. Impact of circuit rebreathing was also examined during sleep (5-10 min periods).

Results: In the five participants studied to date (4M:1F; age 61±6 y; BMI 29±4 kg/m²), inspired CO₂ increased progressively with reduced exhaust flow (continuous model: inspired CO₂ [mmHg] ~ 1/exhaust, $\beta = 19.6$ [14.6, 24.6], estimate[95%CI]; $P < 0.0001$). Compared to exhaust at 35 L/min, progressive exhaust reductions to 23, 18, 13, and 8 L/min led to inspired CO₂ increases by +0.4 [-0.5, 1.2], +0.35 [-0.5, 1.2], +0.7 [-0.3, 1.7], and +2.1 [1.3, 2.9] mmHg respectively. Likewise, we found that inspired O₂ reduced significantly with reduced exhaust flow (continuous model $\beta = -25.1$ [-31.0, -19.1]; $P < 0.0001$). Compared to exhaust at 35 L/min, exhaust reductions to 23, 18, 13, and 8 L/min led to inspired O₂ changes by -0.7 [-1.8, 0.4], -0.6 [-1.7, 0.4], -1.3 [-2.5, -0.03], and -2.7 [-3.7, -1.6] mmHg respectively. With reductions to 23, 18, 13, and 8 L/min, the global breathing discomfort scale changed by -0.2, 0, +0.4, and +1.4 respectively. Similar effects appeared present during sleep.

Conclusion: Our study suggests that rebreathing can occur at exhaust flow levels observed in commercially-available CPAP circuits, and may impact patient comfort.

Support (if any):

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0507

THE EFFECTS OF ACUTE MORPHINE ON OBSTRUCTIVE SLEEP APNEA ENDOTYPES: A SECONDARY ANALYSIS OF A DOUBLE-BLIND, PLACEBO-CONTROLLED, RANDOMIZED TRIAL

Po-Yang Tsou¹, David Wang², Luke Rowsell², Brendon Yee³, Ron Grunstein³, Keith Wong², Andrew Wellman⁴, Danny Eckert⁵

¹Brigham Women's Hospital, ²Woolcock Institute of Medical Research, ³Woolcock Institute of Medical Research, Macquarie

University, ⁴Harvard, Brigham and Women's Hospital, ⁵Flinders Health and Medical Research Institute/Adelaide Institute for Sleep Health, College of Medicine and Public Health, Flinders University, Bedford Park

Introduction: Opioids are associated with respiratory suppression and may worsen obstructive sleep apnea (OSA). We characterized the polysomnographic and endotypic changes among people with OSA exposed to morphine. We hypothesized that morphine would modulate ventilatory control and that greater baseline ventilatory instability would be associated with favorable polysomnographic responses.

Methods: We performed secondary data analysis of 60 males with OSA (aged 44.4±11.7 years, BMI 29.3±3.9 kg/m²) from a double-blind, placebo-controlled, randomized, crossover trial of 40mg oral morphine versus placebo. Endotypic traits (loop gain, arousal threshold, ventilatory response to arousal (VRA), pharyngeal muscle compensation, and collapsibility) were estimated from polysomnography using established computational methods. Paired t-tests were used to compare morphine versus placebo on OSA endotypes. Correlations between baseline endotypes or endotype changes and treatment response were examined using Pearson correlation and linear regression with interaction terms, stratified by OSA severity (severe: apnea-hypopnea index [AHI]≥30 events/h, n=11; non-severe: AHI<30 events/h, n=49). Primary outcomes were changes in AHI, oxygen desaturation index (ODI), and oxygen saturation nadir (SpO₂ nadir).

Results: Morphine significantly reduced the VRA (35±21 vs. 27±19% above eupnea; mean difference -9% [95% CI -15 to -2]; $p=0.012$), while other endotypes were not systematically different. Greater VRA reduction correlated with improvement in SpO₂ nadir ($r=-0.367$, $p=0.004$). Baseline OSA endotypes did not correlate with AHI changes. However, stratified and interaction analyses revealed that baseline loop gain was associated with ODI changes in a severity-dependent manner (interaction $p < 0.001$). In severe OSA, higher baseline loop gain was associated with greater ODI reduction ($r=-0.62$, $p=0.041$), but not in those with mild-moderate OSA ($r=-0.11$, $p=0.443$).

Conclusion: A single 40mg dose of morphine attenuates the ventilatory response to arousal in men with OSA. The correlation between VRA reduction and oxygenation improvement suggests that excessive post-arousal hyperventilation perpetuates ventilatory instability through CO₂ washout and respiratory depression. Morphine may stabilize ventilatory control and reduce desaturation events by dampening arousal-induced overshoot. High baseline loop gain is associated with a reduction in ODI with morphine in those with severe OSA, indicating ventilatory control instability is a therapeutic target in this subgroup. These severity-dependent relationships indicate morphine's effects depend on underlying OSA pathophysiology.

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0508

MENOPAUSAL HORMONE THERAPY AND OBSTRUCTIVE SLEEP APNEA RISK AMONG POSTMENOPAUSAL WOMEN: INSIGHTS FROM NHANES

Faith Luyster¹, Paul Scott², Jonna Morris²

¹University of Pittsburgh School of Nursing, ²University of Pittsburgh

Introduction: Postmenopausal women are at an increased risk of developing obstructive sleep apnea (OSA), possibly due to hormonal changes. The potential of hormone replacement therapy to reduce OSA risk in postmenopausal women remains unclear. Additionally, increasing age and obesity have been postulated to increase OSA risk in postmenopausal women. This study examined the association between menopausal hormone therapy (MHT) and OSA risk in postmenopausal women and examined the influence of confounding factors, age and body mass index (BMI), on this relationship.

Methods: Using data from the 2017-March 2020 National Health Nutrition Examination Survey, we identified 4863 women aged 20 years and older. Postmenopausal status was defined as self-reporting no menstrual period in the past year due to hysterectomy or menopause. High risk of OSA was determined with an adapted multivariable apnea prediction index score of > 0.5 . MHT was defined as a positive response to ever using female hormones like estrogen and progesterone, not including birth control or use for infertility. Regression models adjusted for age, BMI, age at menopause, race/ethnicity, and federal poverty level were employed.

Results: The sample included 2082 postmenopausal women (mean age 63.4 years (SE 0.4); 70.7% non-Hispanic White; mean BMI 30.2 (SE 0.3); 24.7% living $< 130\%$ of federal poverty level). The mean age at menopause was 45.8 years (SE 0.4), and 28.7% reported ever using MHT. MHT users were older, more likely to be non-Hispanic White and have a higher income, experienced menopause at a younger age, and were more likely to have had a hysterectomy compared to non-users. There was no significant difference in BMI between users and non-users. No significant difference in OSA risk was found between MHT users and non-users. Age (OR=1.08, 95% CI 1.07–1.10) and BMI (OR=1.45, 95% CI 1.39–1.51) were significantly associated with high OSA risk, with increasing age and BMI linked to greater odds of being at high risk.

Conclusion: MHT use does not appear to reduce OSA risk in postmenopausal women, whereas age and BMI remain strong predictors of OSA risk. Further research using objective OSA diagnostic measures and more detailed characterization of hormone replacement therapy is needed.

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0509

APPLYING MACHINE LEARNING TO PREDICT OBSTRUCTIVE SLEEP APNEA USING ELECTRONIC HEALTH RECORDS

Nathanael Hwang¹, M. Brandon Westover², Diego Mazzotti³, Dennis Hwang¹, Robert Thomas², Jiaxiao Shi⁴, Rui Yan⁴, Kendra Becker¹, Rosa Woodrum¹, Jessica Yara⁵, Matthew T. Klimper⁵, Haoqi Sun²

¹Kaiser Permanente, Southern California, ²Beth Israel Deaconess Medical Center, ³University of Kansas Medical Center, ⁴Kaiser Permanente, Southern California, Department of Research and Evaluation, ⁵Kaiser Permanente, Southern California, Sleep Medicine

Introduction: Predicting patients at risk of obstructive sleep apnea (OSA) may be incorporated into clinical screening tools. We developed preliminary machine learning (ML) models utilizing electronic health record (EHR) data to predict OSA and moderate-severe OSA.

Methods: We identified adults who underwent diagnostic sleep studies (2016-2025) with available AHI4% values in Kaiser Permanente Southern California. Baseline characteristics were assessed with the following candidate feature categories: demographics, comorbidities, vitals including anthropomorphic data (average over prior one year), and laboratory values (most recent up to five years). Prediction models were developed for two classification tasks: (1) OSA vs No OSA, and (2) moderate-severe OSA (AHI ≥ 15) vs No+Mild OSA (AHI 0–14.9). Data were split into 80% training and 20% testing sets. Logistic regression, random forest, and XGBoost machine learning (ML) models were trained and evaluated on the held-out test set.

Results: 285,292 adults (57% male) were included in the modeling: mean age 50.5 $\pm$ 16.7 years, BMI 33.2 $\pm$ 8.1 kg/m², AHI 20.5 $\pm$ 22.9. OSA prevalence was high: 27.1% normal (AHI < 5), 29.5% mild, 20.0% moderate, 23.3% severe; Race/ethnicity: 38.5% Hispanic, 38.0% White; Asian 9.9%; Black 8.3%, Other/Multiple 5.2%. For predicting OSA (AHI ≥ 5), ML models demonstrated strong discrimination. Random forests achieved the highest overall performance: ROC-AUC 0.84; sensitivity 0.96; specificity 0.43; PPV/NPV 0.82/0.81. Logistic regression showed high sensitivity but lower specificity: AUC 0.76; sensitivity 0.94; specificity 0.34. XGBoost (AUC 0.79) yielded the best rule-in profile, with the highest specificity (0.65) and PPV (0.86), and moderate sensitivity (0.78). For predicting moderate-severe OSA (AHI ≥ 15), performance patterns were similar. Random forests again performed best: ROC-AUC 0.82; sensitivity 0.62; specificity 0.81; PPV/NPV 0.72/0.74. Logistic regression showed good sensitivity but lower specificity (AUC 0.74; sensitivity 0.57; specificity 0.76), while XGBoost (AUC 0.79) provided the highest sensitivity for rule-out classification (0.72) with moderate specificity (0.66). Across both models, OSA and moderate-severe OSA were most strongly predicted by age, male sex, BMI/weight, cardiometabolic comorbidities, and metabolic laboratory biomarkers (e.g., glucose, lipids, HbA1c).

Conclusion: EHR-based ML models demonstrated strong potential for predicting OSA. Key predictors reflected cardiometabolic risk features. Further refinement, model optimization, and real-world validation are needed.

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0510

HYPERPARAMETER-TUNED MACHINE LEARNING PREDICTION OF OBSTRUCTIVE SLEEP APNEA AND INSOMNIA FROM SMARTPHONE APP-DERIVED SLEEP ARCHITECTURE

Elie Gottlieb¹, Luke Gahan¹, Nathaniel Watson², Alice Lynch¹

¹Sleep.ai, ²University of Washington School of Medicine, Department of Neurology

Introduction: Obstructive sleep apnea (OSA) and insomnia remain widely underdiagnosed. Contactless smartphone applications now provide longitudinal, ecologically valid sleep data at scale. We tested whether machine learning (ML) models trained on these data, with systematic hyperparameter and threshold optimization, can effectively screen for OSA and insomnia relative to validated questionnaire-based tools.

Methods: Observational ML modeling used sleep-stage estimates from a PSG-validated smartphone sonar application (SleepScore). Two independent cohorts were analyzed. The survey-threshold (ST) set included 2,813 users (423,085 nights) labeled by Athens

Insomnia Scale ≥ 6 and NoSAS ≥ 8 . The self-report (SR) set included 68,230 users (2.27 million nights) who reported prior insomnia (6%) or OSA (9%) diagnoses. We excluded users undergoing treatment or with comorbid sleep disorders. To improve label accuracy for the ST cohort, inclusion required disorder-consistent objective sleep patterns: for insomnia, sleep-onset latency >30 min, wake after sleep onset >30 min, and sleep duration < 6.5 h with sleep efficiency $< 80\%$ or sleep-maintenance index $< 85\%$; for OSA, ≥ 12 awakenings on ≥ 3 consecutive nights or ≥ 7 on ≥ 3 nights/week for ≥ 4 of 8 weeks. For each user, 262 features summarized nightly time series (distributional metrics, weekday-weekend contrasts, temporal and frequency features, age, and gender). An automated ML framework (PyCaret) compared classifiers using 10-fold cross-validation with 20% holdout, optimizing Cohen's κ . Top models underwent Bayesian hyperparameter tuning (Optuna) with cross-validation and threshold calibration. All splits were user level (80/20) to prevent target leakage.

Results: After tuning, best-performing models achieved AUCs of 0.80 (OSA-SR, linear-discriminant-analysis), 0.74 (OSA-ST, Random Forest), 0.73 (insomnia-SR, Random Forest), and 0.62 (insomnia-ST, ensembled Random Forest). OSA-ST showed balanced precision (0.73) and recall (0.70); OSA-SR favored recall (0.76) over precision (0.29), consistent with class imbalance. Insomnia-ST achieved high recall (0.87) with strong precision (0.78). Feature importance revealed insomnia predictions were driven by sleep-onset latency and timing metrics, while OSA predictions emphasized sleep architecture and fragmentation indices.

Conclusion: Tuned ML models using objective sleep data from a smartphone app identified OSA and insomnia risk with promising discriminative performance and high recall. This scalable approach could help address chronic underdiagnosis by flagging at-risk users for confirmatory testing and earlier intervention.

Support (if any): Sleep.ai

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0511

PREDICTIVE VALUE OF PERIPHERAL ARTERIAL TONOMETRY (PAT)-DERIVED CENTRAL INDICES FOR ADVANCED PAP MODALITY SELECTION IN SEVERE OBSTRUCTIVE SLEEP APNEA

Huzaiifa Wasanwala, Adrienne DaGue, Amira Dalmazio, Ricardo Concepción, Shaheryar Usman, Calli Bertschy, Lilit Sargsyan, Ruckshanda Majid, Reebea Mathew
McGovern Medical School at University of Texas Health Science Center at Houston

Introduction: Home sleep apnea testing using peripheral arterial tonometry (PAT) can estimate central sleep apnea (CSA) and Cheyne-Stokes respiration (CSR). However, the clinical effectiveness of these indices in anticipating positive airway pressure (PAP) modality requirements is not well established. This study evaluated whether PAT-derived central indices in patients diagnosed with severe obstructive sleep apnea (OSA) were associated with escalation to advanced PAP modalities during subsequent titration polysomnography (PSG).

Methods: We conducted a retrospective review of adults with severe OSA, central apnea index (pAHIc) ≥ 5 events/hr, and CSR reported on diagnostic PAT testing (WatchPAT ONE™ was used) who subsequently underwent PSG with PAP titration within 12 months. PAT indices reviewed were pAHI 3%, pAHIc, and CSR percentage. Titration PSG results included residual CSA (AHIc

≥ 5 events/hr), presence of CSR, and prescribed PAP modality. These were categorized as continuous PAP (CPAP), auto-PAP versus advanced PAP modalities, such as bilevel PAP, including adaptive servo-ventilation (ASV). Associations between PAT-derived central apnea burden and titration outcomes were examined, including subgroup trends in patients with congestive heart failure (CHF).

Results: Twelve patients met inclusion criteria (mean age 61.2 ± 12.8 years; BMI 36.3 ± 11.9 kg/m²). Five patients (42%) had CHF. The mean pAHI 3% on the PAT studies was 56.2 ± 13.9 events/hr, the mean pAHIc was 16.8 ± 9.1 events/hr, with a mean CSR occurring in $22.8 \pm 15.8\%$ of estimated sleep. Patients prescribed advanced PAP modalities (50%) demonstrated higher pAHIc burden compared with those treated with CPAP (median pAHIc 18.4 vs 11.9 events/hr; CSR 24.6% vs 17.3%). Furthermore, patients with CHF were more likely to need an advanced PAP (80% vs 29% without CHF). CSR was observed during titration in only 2 patients, both of whom had heart failure with preserved ejection fraction and required ASV. These two individuals demonstrated elevated WatchPAT-estimated central burden, with a mean pAHIc 26.1 events/hr and a high mean CSR 45.8%.

Conclusion: Increased PAT-derived CSA and CSR indices, particularly among individuals with CHF, were associated with escalation to advanced PAP modalities in patients with severe OSA. These findings suggest that PAT-derived central burden may help risk-stratify patients who are more likely to require advanced PAP modalities and help guide appropriate management.

Support (if any):

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0512

PREDICTORS OF OBSTRUCTIVE SLEEP APNEA SEVERITY MISCLASSIFICATION DUE TO CHANGING HYPOPNEA SCORING CRITERIA: A CLINICAL COHORT STUDY

Damien Stevens, Soniya Mishra, Daniel Shippy, Matthew Gratton, Jared Heavens, Whitney Theis, Nick Pfeiff, Nancy Stewart, Saurav Luthra, Usman Nazir, Sowjanya Duthuluru, Diego Mazzotti
University of Kansas Medical Center

Introduction: The apnea-hypopnea index (AHI) continues to be the key metric for assessing obstructive sleep apnea (OSA) diagnosis and severity. However, variability in hypopnea scoring criteria can lead to substantial differences in AHI calculation and OSA severity classification, potentially impacting clinical decision-making, treatment eligibility, and health outcomes. Despite its clinical relevance, predictors of misclassification and the magnitude of AHI differences between these scoring approaches remain poorly characterized. Here, we characterize and identify clinical and demographic predictors of OSA severity misclassification and differences in AHI when applying the two different hypopnea scoring criteria.

Methods: We conducted a retrospective cohort study of adult patients who underwent diagnostic sleep testing at the University of Kansas Sleep Disorders Center between 2023-2025. Included modalities were in-lab polysomnography (PSG), home sleep tests (HST), and peripheral arterial tonometry (PAT) studies. Each study was scored using the 3% desaturation or arousal (3%a) criterion and the 4% desaturation criterion. Misclassification rates across OSA severity categories (none, mild, moderate, severe) were calculated. Associations between misclassification and demographic (age, sex, race, ethnicity) and clinical factors, comorbidities and

study type were assessed using chi-squared tests. Differences in AHI between scoring criteria were analyzed using multivariate linear models.

Results: We included 8,001 individuals (mean [SD] age 54.8 [16.5] years; 50.1% women; 77.7% White; 90.6% non-Hispanic). Overall, 41.8% of patients were classified into a more severe OSA category using the 3% rule compared to the 4% rule. Misclassification was most frequent among PAT studies. Stratified analyses by study type showed that older age (PSG and PAT), male sex (PSG), higher BMI (PSG), lower ESS (PAT), cardiovascular/cerebrovascular disease (PAT), and current smoking (PAT) were significantly associated with misclassification. Multivariate models indicated greater AHI differences for PSG ($\beta=2.7$ events/h) and PAT ($\beta=7.7$ events/h) versus HST ($p < 0.01$). Older age ($\beta=0.08$ events/h), male sex ($\beta=0.45$ events/h), and Black race ($\beta=0.93$ events/h) were also associated with larger AHI differences.

Conclusion: OSA severity change in classification is common when applying the 3% rule versus the 4% rule, particularly among PAT studies, older individuals, and men. These findings underscore the need for harmonized scoring standards to reduce diagnostic variability.

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0513

VALIDATION OF A NEW PAT-BASED SLEEP APNEA DETECTION ALGORITHM WITH SIMULTANEOUS POLYSOMNOGRAPHY

Luu Pham¹, Jonathan Jun², Riva Tauman³, Alan Schwartz⁴

¹Johns Hopkins University, ²Johns Hopkins University School of Medicine, ³Sieratzki Sagol Institute for Sleep Medicine, Tel Aviv Souraski Medical Center, Gray faculty of Medical and Health Sciences, Tel Aviv University, ⁴University of Pennsylvania, Perelman School of Medicine

Introduction: The WatchPAT (WP, ZOLL Itamar) is a widely used PAT-based home sleep apnea test. The company recently applied modern supervised machine learning techniques to develop a new algorithm to detect apneic events, incorporating clinical features and accumulated knowledge gleaned over 20 years of field experience. Over 900 synchronized WP and polysomnography (PSG) recordings were used to train the algorithm. A hybrid neural network (NN) was trained on a wide range of clinically significant features derived from WP channels. The NN combines convolution layers targeting signal morphology and bi-directional LSTM to identify timing connections between sympathetic activation, oximetry, movement and respiration. The outputs are second-by-second probabilities of disordered breathing events, which are then processed to identify discrete events and differentiate from non-respiratory sympathetic activations. The study's goal was to examine the performance of the new algorithm compared to gold standard PSG for diagnosing sleep apnea.

Methods: We conducted a prospective multi-center validation study with simultaneous WP and PSG. Each PSGs was scored according to AASM guidelines by two independent scorers. We compared the frequency of disordered breathing events according to AASM 1A/1B rules (AHI3% and AHI4%, respectively) between WP and each scorer, individually, with Pearson correlation and Interclass correlation coefficient (ICC). Sleep apnea severity classification at apnea-hypopnea index (AHI) thresholds of 5/15/30 events/hour was compared with a linear-weighted Cohen's kappa. Diagnostic performance for moderate-to-severe

sleep apnea (AHI ≥ 15) was assessed via sensitivity, specificity, ROC-AUC and Cohen's kappa.

Results: The validation set comprised 231 subjects (141 Males, Age 52.4 $\pm$ 17.8 years, BMI 32.0 $\pm$ 8.6). WP-AHI3% had excellent correlation with PSG-AHI3% ($r=0.94-0.95$) and ICC (0.93-0.94). Substantial agreement across AHI severity levels (weighted Cohen's kappa 0.76-0.81) was observed. Sensitivity for AHI ≥ 15 was 0.86-0.92. Specificity was 0.83-0.92, ROC-AUC was 0.96 for both scorers. Cohen's kappa indicated substantial agreement (0.73-0.76). For AHI4%, the results showed excellent agreement ($k=0.84-0.89$) for AHI ≥ 15 . The remaining outcomes were similar to those presented for AHI3%.

Conclusion: In a rigorous prospective study incorporating double-scoring, the new WatchPAT algorithm demonstrated high accuracy and agreement with PSG for assessing sleep apnea severity. The updated algorithm provides reliable, consistent, automated sleep apnea diagnosis.

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0514

NON-SUPINE RESPIRATORY EVENTS IMPROVE SIGNIFICANTLY AFTER HYPOGLOSSAL NERVE STIMULATION IN NON-POSITIONAL OBSTRUCTIVE SLEEP APNEA

Su-Hyun Han¹, Hye-Jin Moon², Unjung Cho³, Chang-Hoon Lee⁴, KyoungBin Im⁵

¹Chung-Ang University College of Medicine, ²Soonchunhyang University Bucheon Hospital, ³Inha University Hospital, ⁴Seoul National University Hospital, ⁵University of California, Irvine

Introduction: Studies examining long-term outcomes of hypoglossal nerve stimulation (HNS) by positional phenotype remain limited. This study evaluated 1-year HNS outcomes in patients with positional obstructive sleep apnea (POSA) and non-POSA, and additionally assessing post-treatment changes in positional phenotype.

Methods: We retrospectively reviewed adults who underwent HNS at a tertiary sleep center between December 2020 and January 2024. To ensure reliable positional indices, only patients who slept ≥ 15 minutes in both supine and non-supine positions were analyzed. POSA defined as a supine AHI more than twice the non-supine AHI. Thirty-eight patients (POSA=20, non-POSA=18) who completed baseline and 1-year follow-up sleep apnea testing were analyzed. Outcomes included total AHI, supine AHI, non-supine AHI, minimum oxygen saturation (MinSpO₂), and Epworth Sleepiness Scale (ESS) scores.

Results: In the overall cohort, median total AHI improved from 32.6 to 11.1/h ($p < 0.001$). Supine AHI decreased from 43.3 to 17.1 ($p < 0.001$) and non-supine AHI from 16.7 to 7.0 ($p=0.001$). ESS scores improved from 8.0 to 6.0 ($p=0.003$). When comparing phenotypes, total and supine AHI reductions were similar between POSA and non-POSA. However, non-supine AHI improved markedly in non-POSA compared to POSA (30.3 vs 0.9; $p < 0.001$), with a greater percent reduction (73.0% vs 27.9%; $p=0.025$). Within non-POSA group, non-supine AHI reduction was also greater than supine AHI reduction (30.3 vs 18.4, $p < 0.001$). Regarding phenotype stability, 65% of baseline POSA and 50% of baseline non-POSA maintained the same position-dependency after 1 year. Patients who remained non-positional ($n=9$) showed no significant total AHI improvement ($p=0.086$) and had persistently elevated AHI

(30.6/h). In contrast, baseline POSA improved significantly regardless of position-dependency change, and non-POSA patients who became position-dependent also exhibited significant reductions in total AHI.

Conclusion: Long-term HNS significantly improved respiratory and clinical outcomes in both phenotypes. While total and supine AHI responses were comparable, non-supine AHI improved predominantly in non-POSA patients than POSA. In non-POSA, respiratory events in non-supine position improved more than in supine position. Persistent non-position dependency after treatment was associated with suboptimal outcomes, suggesting that such patients may benefit from earlier adjunctive or combination therapies.

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0515

SMARTPHONE MULTIMODAL SCREENING FOR OBSTRUCTIVE SLEEP APNEA

Daniela Tellez¹, Alvin Lim Zhi Guang², Rakesh Prakash², Andrew Partington², Yang Yan², Yu Heng Goh², Liam Davies², Dominica Leaver², Jinting Xiao², Jaykumar Soni², Bikash Ranjan Bhoi², Juliette Barker², Christopher Gill², Liam Holley², Alison Wimms²

¹ResMed Science Center, ²ResMed

Introduction: Smartphone-based multimodal digital biomarkers may provide an accessible and low-cost alternative to traditional screening of obstructive sleep apnea (OSA) patients. We developed a smartphone app that integrates facial imaging, video-based functional tasks (speech, swallowing, blinking), cardiopulmonary features extracted during paced breathing, and targeted questions. This pilot analysis examined the accuracy of this app to detect OSA risk.

Methods: The app consists of four components designed based on existing or emerging technologies with documented relevance for OSA detection. Screening questionnaires identify individuals with symptom profiles or risk factors associated with OSA. Facial imaging captures features in facial shape, mandibular structure, and neck morphology that may correlate with upper-airway collapsibility. Video recordings during speech, blinking, and swallowing assess visual and acoustic patterns linked to neuromuscular and physiological traits associated with OSA. Heart rate variability during controlled breathing serves as a surrogate marker of autonomic activity, which is often altered in individuals with OSA. The app was tested in awake participants referred for suspected OSA before undergoing overnight sleep testing across multiple clinical centers.

Results: More than 585 participants from Australia and the United States have been enrolled, and 497 have completed the assessment and home sleep test (mean age 48 ± 16.3 , 38% female, 59% non-Hispanic white, mean AHI 22.3 ± 22.9). Preliminary modelling estimates ($n = 209$ participants) combining the four multimodal components suggests potential diagnostic performance of 83% sensitivity, 83% specificity, and AUC-ROC 0.85 for detecting OSA defined as $AHI \geq 5$.

Conclusion: This smartphone-based multimodal assessment demonstrates promising potential for identifying OSA using non-contact, easily deployable digital biomarkers. Additional data from non-clinical populations are required to improve dataset balance and enhance model generalizability. A larger prospective validation study across diverse settings is warranted to confirm

diagnostic performance and real-world application in clinical settings and at home.

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0516

EVALUATING THE RELIABILITY OF PULSE OXIMETRY FOR DETECTING RESPIRATORY EVENTS IN PEDIATRIC OBSTRUCTIVE SLEEP APNEA

Tanya Azar, Thien Nguyen, Judy Mahmalji, Ashura Buckley, Amir Gandjbakhche
National Institutes of Health

Introduction: Obstructive sleep apnea (OSA) is a common sleep-related breathing disorder in children, characterized by recurrent upper-airway obstruction, intermittent hypoxemia, and disrupted sleep architecture. Pulse oximetry is widely used as a noninvasive tool to detect oxygen desaturation events associated with OSA, but its reliability varies across devices, signal quality, and patient populations. Understanding its performance in pediatric cohorts is particularly important, as children demonstrate distinct respiratory patterns and physiologic responses compared to adults.

Methods: To evaluate the reliability of pulse oximetry, we are conducting a clinical sleep study enrolling children aged 3–12 years with and without OSA. Participants undergo overnight, attended polysomnography (PSG) using a full montage that includes electroencephalography (EEG), electrooculography (EOG), electromyography (EMG), airflow measurement via nasal pressure transducer and thermistor, thoracoabdominal respiratory effort belts placed at the chest and abdomen, electrocardiography (ECG), a snoring microphone, body position sensors, and continuous pulse oximetry for oxygen saturation (SpO_2) and plethysmographic signal monitoring. In this ongoing study, we are examining the relationship between deoxygenation events and the magnitude and duration of decreased respiratory effort throughout the night.

Results: We have consented 84 children (mean age = 8.4 ± 2.4 years) and have completed sleep studies on 75 of them. Among these participants, 38 children have OSA. The mean apnea-hypopnea index (AHI) for all 75 children is 4.4 ± 3.4 events per hour. Our preliminary analysis shows that there are multiple events during the night with substantial decreases in respiratory effort, yet no corresponding change is observed in SpO_2 .

Conclusion: Our preliminary findings suggest that significant reductions in respiratory effort may occur without corresponding oxygen desaturation in many pediatric sleep events. These results highlight limitations of relying solely on pulse oximetry to detect clinically relevant respiratory disturbances in children.

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0517

ASSESSMENT OF OBSTRUCTIVE SLEEP APNEA IN HIGH-RISK PREGNANCIES AT INSTITUTO NACIONAL MATERNO PERINATAL IN PERU

Eduardo Bazán Lavanda¹, Erasmo Huertas Tacchino², Jose Camones Huerta³, Cecilia Raraz Rivera³, Maria Espinoza Rojas³, Cecilia Ibañez Rodríguez², Diego Alva Medina⁴, Diana Rodríguez-Hurtado³

¹Rest Peru, ²Department of Fetal Medicine, Instituto Nacional Materno Perinatal, ³School of Medicine, Universidad Peruana Cayetano Heredia, ⁴Department of Gynecology & Obstetrics, Instituto Nacional Materno Perinatal

Introduction: Obstructive Sleep Apnea (OSA) is frequently under-diagnosed during pregnancy, and published data remain scarce, particularly in low- and middle-income countries. Early identification of OSA using accessible sleep study modalities may improve maternal outcomes in resource-limited settings such as Peru. The main objective of this study was to estimate the frequency of OSA among hospitalized high-risk pregnant women using respiratory polygraphy (RP; Type III sleep study)

Methods: We conducted a cross-sectional study including overweight pregnant women ≥ 18 years with a high-risk pregnancy profile. All enrolled participants underwent overnight RP using the ApneaLink Air™ system. Collected data included demographic and clinical variables, Epworth Sleepiness Scale (ESS) scores, and OSA-related symptoms.

Results: A total of 13 pregnant patients were evaluated. The Apnea Hypopnea Index (AHI) had a mean value of 3.12 ± 1.61 , while the number of hypopneas averaged 20.6 ± 11.6 . The Oxygen Desaturation Index (DOI) showed a mean of 5.7 ± 3.08 , and three patients (23%) were diagnosed with mild obstructive sleep apnea (OSA). Additionally, 1 patient (7.7%) had preeclampsia, and 5 patients (38.5%) had gestational diabetes. The average maternal age was 35 ± 3.63 years, and the mean gestational age was 33.4 ± 3.97 weeks. Participants had a mean height of 154 ± 5.42 cm, and the mean BMI was 35.3 ± 2.93 , consistent with class II obesity. The mean Epworth Sleepiness Scale (ESS) score was 8.77 ± 4.76 , with 5 of 13 patients (38%) demonstrating excessive daytime sleepiness (ESS > 10), while the remainder reported normal daytime alertness.

Conclusion: This ongoing study provides early evidence of a burden of OSA among high-risk pregnant women in a middle-income setting. Continued enrollment and analysis will help clarify the clinical significance of OSA in this population and guide the development of feasible screening strategies

Support (if any):

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0518

ASSOCIATION BETWEEN OBSTRUCTIVE SLEEP APNEA AND PSYCHIATRIC SYMPTOMS IN A JAPANESE WORKING POPULATION

Uyanga Tsovoosed, Yukiyoshi Sumi, Yuji Ozeki, Hiroshi Kadotani
Shiga University of Medical Science

Introduction: Obstructive sleep apnea (OSA) is reported to be linked to depression, anxiety, and insomnia, particularly in clinical populations. However, evidence from working, non-clinical populations remains limited. This study examined the association between home sleep apnea testing derived OSA severity and psychiatric symptoms among municipal employees in Japan.

Methods: We performed a cross-sectional study in a Japanese working population to identify the OSA severity associated with psychiatric symptoms based on the results of a questionnaire survey and home sleep apnea tests (HSAT). A total of 707 municipal employees underwent one-night home sleep apnea testing and completed various standardized instruments to evaluate depression (PHQ-9), anxiety (GAD-7), insomnia (AIS) and excessive daytime sleepiness (JESS). Logistic regression models (unadjusted,

fully adjusted, sex-stratified, and shift-work-stratified) were used to examine associations between OSA severity and psychiatric outcomes. Dose-response models using OSA severity as an ordinal predictor were also conducted.

Results: Of the 1543 employees invited to participate, 1247 completed the questionnaire survey. Of those, 707 participants (58% female, 44.8 ± 11.5 years) underwent HSAT and were eligible for analysis. Participants with moderate/severe OSA were older, had higher BMI, and shorter sleep duration compared with those without OSA. In unadjusted models, moderate/severe OSA was associated with lower odds of anxiety and insomnia. Fully adjusted models showed that moderate/severe OSA remained significantly associated with lower odds of depression, anxiety, and insomnia.

Conclusion: In this cohort of working-age municipal employees, HSAT-defined OSA was not associated with higher psychiatric symptom burden. Instead, moderate/severe OSA showed inverse associations with depression, anxiety, and insomnia driven mainly by men and non-shift workers. These results suggest caution in generalizing clinic-based OSA findings to healthy populations.

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0519

ASSOCIATION OF VENTILATORY AND HYPOXIC BURDEN WITH AI-DERIVED OBSTRUCTIVE SLEEP APNEA SYMPTOMS AND RISK FACTORS

Li Zhou¹, Nagharjun Mathi Mariappan¹, Sajila Wickramaratne¹, Zachary Roberts¹, Pavel Boulgakov², Sarah Chu¹, Katarina Martillo¹, Ankita Kumar¹, Sri Saranya Ravi¹, Korey Kam¹, Thomas Tolbert², Andrew Varga¹, Indu Ayappa², David Rapoport², Ankit Parekh¹

¹Icahn School of Medicine at Mount Sinai, ²David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Ventilatory Burden (VB) and Hypoxic Burden (HB) have emerged as physiologic metrics that may improve obstructive sleep apnea (OSA) diagnosis and risk stratification beyond the apnea-hypopnea index (AHI). However, the relationship between VB/HB and OSA symptoms/risk factors, which are used to estimate pre-test clinical probability, remains poorly characterized. Therefore, this study aimed to evaluate the distribution of VB and HB, measured by in-lab polysomnography (PSG), in patients with OSA symptoms/risk factors.

Methods: Retrospective data from suspected sleep apnea patients seen across Mount Sinai Health System in New York were analyzed. OSA symptoms and risk factors, including snoring, witnessed sleep apnea, tiredness/fatigue, age, and male sex, were extracted from clinical notes using large language models. VB and HB were calculated from PSG and categorized as low/high VB (cutoff = 25, Parekh et.al., 2023) or quartiles for HB. Ordinal logistic regression was used to assess associations of VB/HB with OSA symptoms/risk factors, and Spearman correlation evaluated relationships among VB, HB, and AHI.

Results: This study included 2,346 participants with 2,589 PSGs (mean age 55.4 ± 16.0 ; 49.8% male). Among participants with ≥ 3

symptoms/risk factors, 40.4% had high VB, and the distribution of HB was Q1 (20.2%), Q2 (25.0%), Q3 (27.7%), and Q4 (27.1%). Compared with the lowest HB quartile (Q1), participants in Q2, Q3, and Q4 had greater sleep apnea symptoms/risk factors (ORs 1.82, 2.65, and 2.75; all $p < 0.001$). High VB (≥ 25) was also associated with greater symptoms/risk factors (OR 1.84; $p < 0.001$). HB and VB were moderately correlated ($\rho = 0.55$) and showed similar correlations with AHI (HB $\rho = 0.39$; VB $\rho = 0.41$). Notably, among participants with AHI < 5 , 22.4% had high HB and 28.1% had high VB.

Conclusion: Higher VB and HB are strongly associated with greater sleep apnea symptoms/risk factors, supporting their relevance as diagnostic markers. The presence of high VB/HB among individuals with low AHI underscores the limitations of relying on AHI alone. These findings indicate the potential value of integrating VB and HB into diagnostic evaluation, particularly for patients with high clinical suspicion of OSA.

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0520

ASSOCIATIONS BETWEEN CBC DERIVED BLOOD INDICES AND MACULAR THICKNESS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Baraa Hussein, Samantha Dreyer, Deniz Oncel, Stephanie Tan, Sunita Kumar, Charles Bouchard, Omer Iqbal
Loyola University Chicago Stritch School of Medicine

Introduction: Obstructive sleep apnea (OSA) is characterized by intermittent hypoxia and sleep fragmentation, driving a chronic inflammatory state reflected in elevated cytokines and altered hematologic indices. Optical coherence tomography (OCT) enables quantitative assessment of retinal structure, and prior studies suggest that OSA is associated with retinal changes. Although neutrophil-to-lymphocyte (NLR), monocyte-to-lymphocyte (MLR), and platelet-to-lymphocyte (PLR) ratios have been evaluated as inflammatory markers in OSA, findings remain inconsistent and relationships between these indices and OCT parameters have yet to be explored. Additional ratios including hemoglobin-to-platelet (HPR), lymphocyte-to-red blood cell (LRR), platelet-to-monocyte (PMR), hemoglobin-to-lymphocyte (HLR), and monocyte-to-red blood cell (MRR) remain to be examined. Defining these associations may improve OSA risk stratification and clarify retinal involvement.

Methods: CBC values from 66 OSA patients were reviewed, and macular OCT scans were available for 19 after excluding those with macular pathology. OCT parameters included central, inner, and outer macular thickness across four quadrants. A control cohort of 55 patients had CBC values available and 7 of the 55 had OCT scans. Inflammatory indices were calculated for all OSA. Primary analyses assessed associations between inflammatory indices and macular thickness using Spearman correlation. Secondary analyses compared macular thickness and inflammatory indices between OSA patients and controls using independent-samples t tests, Mann-Whitney U tests, or MANOVA. Significance was set at $p < 0.05$.

Results: No inflammatory indices demonstrated statistically significant correlations with central or ring-based macular thickness in the OSA group (all $p > 0.05$). Central macular thickness did not differ between OSA patients and controls. Inner ring thickness

was significantly reduced in OSA ($286.0 \pm 20.7 \mu\text{m}$ vs $334.1 \pm 7.7 \mu\text{m}$, $p = 0.00017$), while outer ring thickness was greater ($335.2 \pm 27.9 \mu\text{m}$ vs $294.2 \pm 8.4 \mu\text{m}$, $p = 0.0016$). Compared with controls, OSA patients had higher NLR, PLR, and MRR and lower WNR, HPR, and PMR (all $p < 0.01$).

Conclusion: In this cohort, CBC-derived inflammatory indices were not associated with macular thickness measurements in OSA patients. Although macular thickness differences were observed between OSA and control subjects, small sample sizes limit definitive interpretation. Larger studies with paired CBC-OCT datasets are needed.

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0521

COMORBID INSOMNIA AND SLEEP APNEA: ASSOCIATION WITH NOCTURNAL HYPOXIC BURDEN

Paula Alana Seixas¹, Laís Mota², Henrique Terceiro¹, Gabriela Brito¹, Miguel Cruz³, Cristina Salles²

¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Universidade de Portugal

Introduction: The phenotype of Comorbid Insomnia and Obstructive Sleep Apnea (COMISA) represents a formidable clinical challenge, intrinsically linked to heightened cardiovascular and metabolic morbidity. Hypoxic Burden (HB), quantified as the cumulative exposure to intermittent hypoxemia. We postulate that HB acts as a persistent physiological stressor, exacerbating underlying hyperarousal and significantly contributing to Sleep Maintenance Difficulty (SMD), a hallmark complaint of insomnia. To evaluate the association between Wake After Sleep Onset (WASO), an objective polysomnographic marker of Sleep Maintenance Difficulty, and Hypoxic Burden (HB) in patients diagnosed with Obstructive Sleep Apnea (OSA).

Methods: This was a cross-sectional study nested within a larger cohort, evaluating 36 individuals (58.1% female; mean age 53.95 ± 11.86 years). Participants with established OSA were included. Data collected encompassed: Body Mass Index (BMI), Oxygen Desaturation Index (ODI), heart rate (HR), oxygen saturation (SpO_2), time of saturation $< 90\%$ ($\text{TS} < 90\%$), Insomnia Severity Index (ISI), and Hypoxic Burden (HB). HB was measured using a validated formula considering the area under the curve of oxyhemoglobin desaturations $\geq 3\%$.

Results: The median WASO for the sample was 43.50 (IQR 18.75 – 76.63) minutes. Notably, 68.2% of individuals exhibited a WASO of at least 30 minutes. Furthermore, WASO demonstrated correlations with several key parameters: HL ($r = -0.455$; $p = 0.034$), ODI ($r = -0.378$; $p = 0.011$), Age ($r = -0.389$; $p = 0.073$), BMI ($r = -0.463$; $p = 0.030$), minimum HR ($r = 0.283$; $p = 0.201$), mean HR ($r = 0.187$; $p = 0.404$), maximum HR ($r = 0.538$; $p = 0.10$), ΔHR ($r = 0.558$; $p = 0.007$), mean SpO_2 ($r = 0.658$; $p = 0.003$), maximum SpO_2 ($r = 0.521$; $p = 0.013$), $\text{TS} < 90\%$ ($r = -0.597$; $p = 0.003$), total time in hypoxemia ($r = -0.127$; $p = 0.574$), EPW ($r = -0.319$; $p = 0.148$), ISI ($r = 0.294$; $p = 0.183$).

Conclusion: These preliminary data demonstrate that HB is inversely associated with WASO in patients with OSA. This suggests that HB may be a key pathophysiological factor driving Sleep Maintenance Difficulty in the challenging COMISA phenotype.

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0522

DO SCREENING TOOLS FOR OBSTRUCTIVE SLEEP APNEA CORRELATE WITH AHI IN INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT: A SMALL COHORT STUDYAlexander Ismail, Brad Vaughn, Nathan walker, Zheng Fan, Katelyn Bricker, Heidi Roth
University North Carolina Chapel Hill

Introduction: The incidence of obstructive sleep apnea (OSA) increases with age and the prevalence of central neurologic diseases. In adults over 65yrs, the prevalence can be as high as 35.9%. Questionnaires, such as STOP-BANG (SB) or Epworth sleepiness scale (ESS), are often utilized to assess the risk of OSA and the need for in lab polysomnography (PSG). Previous studies suggest the STOPB-28 (SB28), which excludes age, sex, neck size, and adjusts the BMI cutoff to 28, is better tailored to those with mild cognitive impairment (MCI). Our goal was to examine the correlation of the questionnaire scores in patients with MCI who underwent PSG with the severity of OSA.

Methods: The data were extracted from 43 patients enrolled in a cognitive registry who had a PSG within three years of their initial cognitive evaluation. Participants completed SB and ESS questionnaires before their PSG. Patients were excluded with a Montreal Cognitive Assessment Score (MOCA) less than 18. Hypopnea events were scored using 3% or arousal hypopnea criteria. Correlation coefficients between questionnaires and obstructive AHI were calculated (significance $p < 0.05$). Fisher exact tests and odds ratios (OR) were used to compare questionnaire predicted outcomes with PSG, using SB scores 3 and 5 and SB28 score 2.

Results: The average age of the cohort was 70.8yrs $\pm$ 7.7, 60% male, and average MOCA of 24.0 $\pm$ 3.1. 88% of the participants had OSA. Mild, moderate, and severe OSA were present in 23.3%, 41.9%, and 23.3% of the total participants, respectively. ESS, SB, and SB28 questionnaires did not correlate with obstructive AHI ($R < 0.2$). Fisher exact test did not show a significant association between SB score 3 or 5, or SB28 with AHI > 15 ($p = 0.11, 0.35$ and 0.14 respectively), or OR 6.75 (95% CI: 0.63-71.7), 2.06 (95% CI: 0.52-8.10) and 2.63 (95% CI: 0.69-9.89).

Conclusion: In our cohort with MCI, the ESS, SB, and SB28 did not correlate with severity of OSA. The data suggest additional screening may be needed to evaluate the risk of OSA in patients with MCI.

Support (if any):

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0523

EVALUATING SYMPTOM-BASED SCREENING TOOLS FOR OBSTRUCTIVE SLEEP APNEA IN EMERGENCY RESPONDERSDavid Goldfarb¹, David Appel², Rachel Zeig-Owens¹, David Prezant³¹Albert Einstein College of Medicine, ²Montefiore Medical Center, ³Fire Department of the City of New York

Introduction: Fire Department of the City of New York (FDNY) emergency responders have a high prevalence of obstructive sleep apnea (OSA), yet the performance of oft-used subjective symptom instruments in this population is not fully understood. Clarifying relationships among the Epworth Sleepiness Scale (ESS),

Berlin Questionnaire (Berlin), and physiologic severity (apnea-hypopnea-index, AHI) may improve OSA screening among responders referred for polysomnography.

Methods: We analyzed FDNY emergency responders who performed clinically indicated diagnostic polysomnography and completed ESS and Berlin. We categorized ESS as normal (0-10) or high (>10). We summarized Berlin risk as the number of positive domains (0-3) and dichotomized as low (0-1) or high (2-3). We combined dichotomized ESS and Berlin measures creating four symptom phenotypes - low Berlin/low ESS, low Berlin/high ESS, high Berlin/low ESS, and high Berlin/high ESS. We compared AHI across ESS, Berlin, and phenotype using log-binomial regression to estimate risk ratios (RRs) for moderately severe OSA ($AHI \geq 15$), adjusting for age.

Results: Among 1,863 responders performing polysomnograms, the median AHI was 14.3 (IQR=5.7-28.5). Both age and BMI increased with AHI severity. Most participants had normal ESS scores (1,213; 63.1%), despite substantial Berlin symptom burden. 1,262 (65.6%) screened positive on ≥ 2 domains with phenotypes high Berlin/low ESS (713; 38%), high Berlin/high ESS (N=531; 29%), low Berlin/low ESS (N=462; 25%), and low Berlin/high ESS (N=157; 8%). AHI increased across Berlin domain counts (median 8.2, 10.4, 15.6, and 17.2 for 0, 1, 2, and 3 domains, respectively) but varied minimally across ESS categories. In adjusted models, symptom phenotype predicted OSA. Compared with low Berlin/low ESS, risk of OSA were higher for high Berlin/high ESS (RR=1.51; 95%CI=1.30-1.75) and for high Berlin/low ESS (RR=1.63; 95%CI=1.42-1.87), while low Berlin/high ESS was not associated (RR=1.15; 95%CI=0.91-1.45).

Conclusion: In this clinically selected WTC-exposed cohort referred for polysomnography, Berlin symptom burden, but not ESS sleepiness, closely reflected physiologic OSA severity. The high Berlin/low ESS group showed that many responders had substantial OSA risk despite minimal subjective sleepiness.

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0524

EXAMINING THE RELATIONSHIP BETWEEN POSITIONAL OBSTRUCTIVE SLEEP APNEA AND CARDIOVASCULAR OUTCOMES: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSISXiaoyue Liu¹, Jeongok Logan², Jinyu Hu¹, Arie Oksenberg³, Joachim Behar⁴, William Healy⁵, Yeilim Cho⁶, Susan Redline⁷, Younghoon Kwon⁸¹New York University, ²University of Virginia, ³Loewenstein Hospital Rehabilitation Center, ⁴Israel Institute of Technology at Technion, ⁵Augusta University, ⁶VA Puget Sound Medical Center, ⁷Brigham and Women's Hospital, ⁸University of Washington

Introduction: Positional obstructive sleep apnea (POSA) is characterized by obstructive events that occur predominantly in the supine position. This phenotype may be associated with lower cardiovascular risks than those without POSA. However, the causal relationship between POSA and cardiovascular (CV) outcomes remains unclear.

Methods: We used data from the Multi-Ethnic Study of Atherosclerosis (MESA) Exam 5 and beyond, along with polysomnography data from the Ancillary Sleep Study. Eligible participants had no prior CV events at Exam 5 and met the following criteria: apnea-hypopnea index (AHI - defined by the AASM's 4% oxygen desaturation criterion) ≥ 5 , a total sleep

time (TST) ≥ 2 hours, and ≥ 30 minutes spent in both supine and non-supine positions. POSA was defined as a supine/non-supine AHI ratio ≥ 2 . Outcomes included CV risk (measured using a continuous composite score of seven CV risk factors and analyzed by linear regression), as well as incidence of CV events, CV mortality, and all-cause mortality (analyzed by Cox proportional hazards regression). We estimated two models, one unadjusted and one adjusted for multiple potential confounders. **Results:** The sample included 1,017 adults (mean age 68 ± 9 , 52% female, 42% with POSA). The average AHI was 22.2 ± 16.3 (POSA vs. non-POSA: 19.6 vs. 25.8, $p < 0.001$). Over an average 9.5-year follow-up, 111 participants experienced CV events, 34 died from CV causes, and 125 died from all causes. Compared with the non-POSA group, the POSA group showed a significantly lower CV risk in the unadjusted model (β : 0.28, 95% confidence interval [CI]: 0.08-0.49, $p = 0.007$). However, the relationship was attenuated after adjusting for the covariates (β : 0.15, 95% CI: -0.05 to 0.34, $p = 0.137$). No statistically significant between-group differences were observed in the hazards of incidence of CV events (adjusted hazard ratio [aHR]: 0.81, 95% CI: 0.55-1.18, $p = 0.268$), CV mortality (aHR: 0.79, 95% CI: 0.40-1.58, $p = 0.506$), or all-cause mortality (aHR: 0.86, 95% CI: 0.60-1.24, $p = 0.421$).

Conclusion: This study did not provide evidence for differences in CV outcomes in adults with and without POSA. However, future follow-up is needed to confirm the lack of association.

Support (if any):

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0525

GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS, OBSTRUCTIVE SLEEP APNEA, AND MORTALITY IN PATIENTS WITH TYPE 2 DIABETES: THE FIRST 10 YEARS

Diana Song¹, Yitzchak Zolty², Donald Bliwise³, Cosmo Fowler⁴

¹Emory University School of Medicine, ²Medical College of Georgia, ³Emory University, ⁴Piedmont, Emory

Introduction: GLP-1 receptor agonists (GLP-1RAs) reduce cardiovascular mortality in type 2 diabetes (T2DM) while improving obstructive sleep apnea (OSA) severity. Whether individual GLP-1RAs differ in mortality benefit, and whether OSA modifies these agent-specific effects, remains unknown.

Methods: Using the U.S. Collaborative Network (>122M patient records across 70 U.S. healthcare organizations) on the TriNetX data platform, we identified patients (using encounter ICD-10-CM diagnostic codes) between 10/2015 – 10/2024 with a history of T2DM who were prescribed metformin with or without GLP-1RA (using RxNorm codes). We additionally stratified these patients as having a history of OSA (2 or more encounter diagnostic codes) and compared 1-year all-cause mortality from time of tirzepatide, semaglutide, dulaglutide, or liraglutide prescription (versus metformin if not prescribed GLP-1RAs). Cox proportional hazards models compared mortality between those patients prescribed GLP-1RAs and those not, as well as in head-to-head comparisons between agents, adjusting these models for age, sex, race, as well as BMI and HbA1c category.

Results: We identified 2,471,348 patients with T2DM, of which 714¹, 91 were prescribed at least one GLP-1RA: most commonly semaglutide, followed by dulaglutide, liraglutide, and tirzepatide. The GLP-1RA class reduced mortality by 59% in OSA (HR 0.41, 95% CI 0.39 – 0.43), versus 55% in non-OSA patients (HR 0.45, 95% CI

0.44 – 0.47). A consistent potency hierarchy emerged: tirzepatide (OSA: HR 0.24; non-OSA: 0.23), semaglutide (OSA: HR 0.36; non-OSA: 0.33), dulaglutide (OSA: HR 0.47; non-OSA: 0.50), and liraglutide (OSA: HR 0.50; non-OSA: 0.54), all $p < 0.001$. Older agents (dulaglutide, liraglutide) were associated with enhanced mortality benefit in OSA, while tirzepatide and semaglutide showed equivalent benefit regardless of OSA status. Head-to-head analyses confirmed tirzepatide superiority over semaglutide in both populations (OSA: HR 0.69; non-OSA: HR 0.73). Dulaglutide and liraglutide were equivalent in OSA (HR 0.90, $p=0.06$) but not in non-OSA (HR 0.86, favoring dulaglutide, $p=0.006$).

Conclusion: GLP-1RAs demonstrate substantial mortality reduction in T2DM, with enhanced class effect in OSA patients. A clear potency hierarchy exists, with tirzepatide consistently showing the greatest mortality reduction, followed by semaglutide. The class effect observed in OSA appeared driven primarily by older agents, with tirzepatide and semaglutide yielding similar benefit regardless of OSA status.

Support (if any):

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0526

LIFE'S ESSENTIAL 8 AND THE RISK OF CARDIOVASCULAR DISEASE AMONG INDIVIDUALS WITH AND WITHOUT OBSTRUCTIVE SLEEP APNEA SYMPTOMS

Chien-Yu Tseng, Ginger Chang, Yi Guo, Shuang Yang, Earl Morris, Christopher Kaufmann
University of Florida

Introduction: The American Heart Association's Life's Essential 8 (LE8) is a composite measure of cardiovascular health. Obstructive sleep apnea (OSA) increases risk of cardiovascular disease (CVD), but less is known about differences by presence of OSA symptoms. We examined the association between LE8 scores and prevalent CVD and assessed effect modification by presence of OSA symptoms.

Methods: This cross-sectional study used data from 2015-2020 National Health and Nutrition Examination Survey (NHANES). We included adults aged ≥ 18 years who self-reported OSA symptoms and excluded those pregnant or breastfeeding or had missing data on OSA or CVD measures. LE8 scores were computed using previously used algorithm (range 0-100) and categorized as low (0- < 50), moderate (50- < 80), and high (80-100) CVD health. OSA symptoms were defined as self-report of any three OSA symptoms: a) snoring ≥ 3 nights/week, b) snorting/stopping breathing ≥ 3 nights/week, or c) feeling overly sleepy during day 16-30 times/month. CVD was defined as self-reported physician diagnosis of angina, congestive heart failure, coronary artery disease, myocardial infarction, or stroke. We used multivariable logistic regression to estimate association between LE8 and CVD, overall and stratified by OSA symptoms, adjusting for age, gender, race, education level, marital status, poverty ratio, drinking status, and family history of CVD.

Results: Among 10,546 NHANES participants, 5,277 (48.5% [weighted]) reported any OSA symptom, and 5,269 (51.5%) did not. Higher LE8 scores were associated with lower odds of CVD, and results varied by OSA symptoms. Among participants with OSA symptoms, moderate and high LE8 scores were associated with significantly lower odds of CVD compared to those with low LE8 scores (moderate: adjusted odds ratio [aOR]=0.44; 95%

confidence interval [CI]=0.32–0.59; high: aOR=0.17; 95% CI=0.07–0.39). In those without, associations were more modest (moderate: aOR=0.77, 95% CI=0.57–1.04; high: aOR=0.51, 95% CI=0.31–0.83).

Conclusion: Higher LE8 scores, reflecting better cardiovascular health, are associated with lower odds of prevalent CVD, particularly among adults reporting OSA symptoms. These results suggest optimizing cardiovascular health may be especially important in adults with OSA symptoms to reduce cardiovascular disease burden.

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0527

OBSTRUCTIVE SLEEP APNEA PATIENT JOURNEY FROM FIRST SYMPTOM TO CONFIRMED DIAGNOSIS: A REAL-WORLD ANALYSIS OF PATIENTS IN THE UNITED STATES

Chris Schmickl¹, Kristina Yu², Lauren Lee³, James Jackson³, Ana Sanchez -Azofra², John Cronin², John Yee², Richard Schwab⁴

¹Division of Pulmonary, Critical Care, Sleep Medicine and Physiology, University of California, San Diego, ²Apnimed, Inc., ³Adelphi Real World, ⁴University of Pennsylvania Perelman School of Medicine

Introduction: Obstructive sleep apnea (OSA) results in repetitive collapse of the upper airway during sleep, leading to arousals and intermittent hypoxia. Despite its high prevalence and associated cardiovascular and neurocognitive risks, most cases remain undiagnosed and untreated. Variations in healthcare providers and OSA presentation are challenges in OSA diagnosis. To address this gap and identify opportunities for improvement, we examined data characterizing the patient journey in real-world clinical practice.

Methods: Data were analyzed from the Adelphi Real World OSA Disease Specific Programme™, a cross-sectional survey of physicians and patients in the United States from April–November 2025. Physicians completed chart reviews, capturing demographic, diagnostic, and clinical outcomes, for up to ten consecutively seen adult patients diagnosed with OSA and not enrolled in OSA trials.

Results: Overall, 142 physicians (36% primary care physicians [PCPs], 31% sleep specialists, 21% pulmonologists, 12% neurologists) reported data for 1,096 patients. Mean (standard deviation) patient age was 53.4 (13.7) years and 66.0% were male. Median [IQR] time from first reported symptom to diagnosis was 6.9 [2.6–19.7] months. At diagnosis, median [IQR] apnea-hypopnea index (AHI) was 24.0 [15.0–36.0] events/hour and most common symptoms were fatigue (55.8%), daytime sleepiness (54.3%) and loud snoring (52.7%); 17.2% did not report any of these classical symptoms. A quarter of patients delayed seeking care for OSA (49.9% didn't delay, 24.9% don't know), often due to patient lacking awareness of OSA (53.3%) or denial (40.6%), non-specific signs/symptoms (26.1%), and/or embarrassment (18.8%). Additionally, delays of ≥1-month from first physician visit to diagnoses were reported for 50.8% of patients, commonly due to long sleep-specialist referral times (33.6%) and non-specific signs/symptoms (26.8%). Sleep specialists diagnosed 39.2% of cases; most diagnoses were made by other clinicians, often PCPs (22.0%), pulmonologists (21.5%), neurologists (9.9%).

Conclusion: Diagnostic delays are common among patients with OSA, often due to limited patient awareness, non-specific symptoms, patient embarrassment, and limited access to sleep specialists. Raising public awareness to improve recognition and reduce stigma, expanding training of non-sleep specialists to support management, and streamlining sleep specialist services to prioritize and increase capacity, may help enable earlier diagnosis and improved outcomes for patients with OSA.

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0528

PROSPECTIVE CHANGE IN OBSTRUCTIVE SLEEP APNEA FREQUENCY, AND SLEEP DURATION: THE HISPANIC COMMUNITY HEALTH STUDY/STUDY OF LATINOS

Maia Junco¹, Wassim Tarraf², Christian Agudelo¹, Charles DeCarli³, Martha Daviglus⁴, Linda Gallo⁵, Hector Gonzalez⁶, Kevin Gonzalez⁶, Sonya Kaur¹, Yasmin Mossavar-Rahmani⁷, Amber Pirzada⁸, Daniela Sotres-Alvarez⁹, Murray Mittleman¹⁰, Susan Redline¹¹, Alberto Ramos¹²

¹University of Miami, ²Wayne State University, ³UC Davis, ⁴University of Illinois Chicago, ⁵San Diego State University, ⁶University of California, ⁷Albert Einstein College of Medicine, ⁸Institute for Minority Health Research, ⁹University of North Carolina at Chapel Hill, ¹⁰Harvard T.H. Chan School of Public Health, ¹¹Brigham and Women's Hospital, ¹²University of Miami School of Medicine

Introduction: Prospective changes in obstructive sleep apnea (OSA) and sleep durations in Hispanic/Latinos are unknown. Understanding the impact of cardiometabolic risk factors on the longitudinal burden of OSA and abnormal sleep duration will be essential for advancing sleep aging research. This study aimed to measure these changes and their correlations in HCHS/SOL.

Methods: We analyzed data from HCHS/SOL Visit 1 (2008–2011) who returned to complete an ancillary study on sleep and brain health, sleep in neurocognitive aging and Alzheimer's research (SANAR; 2022–ongoing). At both visits, participants completed home sleep apnea tests and self-reported sleep duration categorized as abnormal (< 7 hours or ≥ 9 hours) and recommended (7–< 9 hours). Prospective change categories included abnormal-to-recommended, consistently-recommended, and consistently-abnormal sleep duration. The respiratory event index (REI3%) was categorized into < 15 at both visits, transient-elevated (≥ 15 at any time), and persistent-elevated (≥ 15 at both visits). Multinomial logistic regression examined associations with Body Mass Index (BMI), baseline hypertension, prediabetes, and diabetes adjusting for age and sex.

Results: We examined 1,662 participants (67% female; mean age 67.5 years, SD = 6.4). From V1 to SANAR, the mean sleep duration increased (7.8±1.3 to 8.5±1.5 hrs.), REI3% doubled (7.5±12 to 14±16.6), and BMI was stable (29.9±5.3 to 30.1±6.5). At visit-1, 36% had hypertension, 47% pre-diabetes and 22% diabetes. Male sex, older age, baseline pre-diabetes and diabetes, and higher BMI were associated with higher relative risk ratios (RRR) for REI3% ≥ 15 at SANAR (range: RRRdiabetes=1.13 to RRRmale=3.73) and for persistent REI3% ≥ 15 across both visits (range: RRR-BMI=1.15 to RRR-male=5.53). Older age, baseline hypertension, prediabetes, and diabetes were associated with increased RRR for long sleep duration at SANAR (range:

RRRhypertension=1.09 to RRRage75+=1.92) and for transitioning from recommended to abnormal sleep duration (range: RRRdiabetes=1.09 to RRRage75+=1.50). Males had a lower probability of long sleep duration and of transitioning to abnormal sleep duration.

Conclusion: Preliminary prospective analyses in a large sample of Hispanic/Latino adults show that older age and poorer cardiometabolic health predict persistent sleep apnea and abnormal sleep duration. These findings support strategies to improve sleep and cardiometabolic health in the aging population.

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0529

REDUCED FOREARM SKIN CONDUCTANCE RESPONSES DURING OBSTRUCTIVE APNEA EVENT IN PATIENTS WITH OSA

Yousei Yamaguchi¹, Wakako Yamasawa², Akihito Miyamoto², Yusuke Nagai¹, Jianchen Ding¹, Sunghoon Lee³, Hiroshi Kawasaki², Kento Yamagishi¹, Tomoyuki Yokota¹, Masayuki Amagai², Takao Someya¹, Koichi Fukunaga², Masaki Sekino¹

¹University of Tokyo, ²Keio University School of Medicine, ³RIKEN, The Institute of Physical and Chemical Research

Introduction: Electrodermal activity (EDA) measured on the palm has been used as a physiological indicator of sympathetic nervous activity. Previous studies in healthy individuals have reported that skin conductance responses (SCRs), a phasic component of EDA, occur most frequently during deep sleep (N3), although evidence in Obstructive Sleep Apnea (OSA) patients remains limited. We hypothesized that similar patterns would appear in OSA. This study aimed to characterize forearm SCR patterns in OSA patients and to evaluate their utility as markers of sleep stages and respiratory events, including obstructive apneas and hypopneas.

Methods: Nine OSA patients underwent simultaneous polysomnography and skin conductance monitoring. Skin conductance was recorded with a wearable device using a nano-mesh dry electrode, providing breathability and flexibility. SCR counts were defined as the number of times that skin conductance derivative exceeds a predefined threshold per 30-s epoch. A relative threshold (median + 3×MAD) was used for within-subject analysis and an absolute threshold (0.01 μ S/s) for between-subject comparisons.

Results: In the pooled within-subject analysis across all patients, SCR counts (mean $\pm$ SE) increased with sleep stage, following Wake < N1 < REM < N2 < N3 (0.85 $\pm$ 0.15 < 1.25 $\pm$ 0.22 < 1.32 $\pm$ 0.33 < 2.00 $\pm$ 0.35 < 3.18 $\pm$ 0.77; Friedman χ^2 = 13.30, p < 0.05). SCR counts also varied across respiratory conditions, following obstructive apneas < hypopneas < normal breathing (1.02 $\pm$ 0.60 < 1.58 $\pm$ 0.30 < 2.11 $\pm$ 0.31), and obstructive apneas consistently yielded the lowest SCR counts across sleep stages (N1, N2, N3, REM). In the between-subject analysis, the nightly mean SCR counts calculated for each participant showed a strong negative correlation with the proportion of abnormal breathing time (r = -0.70, p < 0.05).

Conclusion: This study provides the first evidence that SCRs decrease during obstructive apnea events in OSA patients and that individuals with more frequent apnea/hypopnea events show fewer SCRs across the night. Given its compatibility with wearable devices, forearm EDA during sleep may serve as a useful

indicator of sleep quality, reflecting deeper sleep and reduced abnormal respiratory time, for future high-accuracy, home-based sleep monitoring.

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0530

RURAL AND URBAN DIFFERENCES IN OBSTRUCTIVE SLEEP APNEA REFERRALS IN PRIMARY CARE

Joscilin Mathew¹, Himani Sancheti², Brittany Lapin², Marisa McGinley³, John Thornton⁴, Cinthya Pena-Orbea⁵

¹Cleveland Clinic Foundation, ²Cleveland Clinic Lerner Research Institute, ³The Mellen Center for Multiple Sclerosis Treatment and Research, Department of Neurology, Neurological Institute, Cleveland Clinic Foundation, ⁴The MetroHealth System, Case Western Reserve University, ⁵Cleveland Clinic

Introduction: Limited access to obstructive sleep apnea (OSA) evaluation has increased interest in primary care-based care models, yet structural and geographic factors may influence referral patterns. We hypothesized that OSA referral rates within primary care differ by patients' geographic location after accounting for individual and neighborhood socioeconomic factors.

Methods: A retrospective cohort study was conducted using our electronic medical record to identify adult patients at risk for OSA who were seen in primary care at the Cleveland Clinic Health System (Ohio and Florida) from 2017 to 2024. We included patients who received either a sleep medicine consultation or a polysomnogram or type III order within 12 months of the primary care visit. High-risk patients for OSA were defined by the presence of at least one of these comorbidities: obesity (>30 kg/m²), heart failure, atrial fibrillation, hypertension, diabetes, cardiac arrhythmias, stroke, pulmonary hypertension, or coronary artery disease; a BMI greater than 35 kg/m²; and a STOP score $\geq$ 2. Rural-Urban Community Area codes were used to identify patients residing in rural and urban areas. Multivariable logistic regression was performed to examine the association between rural vs. urban residence and OSA referral, adjusting for age, sex, race, BMI, insurance, State, and Area Deprivation Index. Continuous variables were centered to mitigate multicollinearity.

Results: Of 25,917 patients at high risk for OSA, 3,874 were rural, and 22,043 were urban patients. Only 15% of rural patients were referred for OSA evaluation compared to 20% of urban patients (p < 0.001). Among those referred, rural patients had a higher BMI (41.5 kg/m² [IQR 37.8–46.4] vs 40.4 kg/m² [IQR 37.4–45.4]; p = 0.003), were less likely to be referred while on government insurance (29.3% vs 42.2 %, p < 0.001) and lived in neighborhoods with higher socioeconomic disadvantage (ADI, 70 [58–85] vs 67 [45–88]; p < 0.001) compared with referred urban patients. After the adjusted model, rural patients had lower odds of receiving an OSA referral compared to patients in urban areas (OR = 0.75, 95% CI: 0.66, 0.82).

Conclusion: Patients at high risk for OSA in rural primary care settings are less likely to be referred for evaluation than those in urban areas. These findings highlight the need to understand geographic-specific barriers to obtaining OSA evaluation to reduce inequities among rural populations.

Support (if any):

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0531

SCREENING FOR OBSTRUCTIVE SLEEP APNEA IN THE PULMONARY FUNCTION LAB: A QUALITY IMPROVEMENT INITIATIVEKristina Kunes¹, Anas Rihawi¹, Gregory Eck², Adam Turigliatto³, Thomas Lindsley³, Tanvi Mukundan³, Jeremy Wearn³, Christian Martin Morales³, John Mastronarde³¹Oregon Health and Science University, ²Veterans Health Administration, ³Portland VA Medical Center

Introduction: Obstructive sleep apnea (OSA) is a chronic sleep disorder affecting nearly 1 billion adults aged 30-69 years globally. Veterans are at particularly high risk given OSA is twice as prevalent in this population. OSA increases risk for hypertension, diabetes, cardiovascular disease, stroke, and dementia among others. Despite its prevalence and health consequences, OSA remains widely underdiagnosed, underscoring the urgent need to increase screening within the VA Health Administration and beyond. This study aims to improve detection of OSA by administering the STOP questionnaire to all veterans presenting for pulmonary function testing (PFT).

Methods: This prospective study was determined to be exempt by the Portland VA IRB. Beginning 10/2024, the respiratory therapist (RT) in the PFT lab administered the STOP questionnaire to all veterans unless they declined, have OSA, or have been previously referred to sleep clinic. The RT recorded the results in the PFT report and we subsequently collected and analyzed the following data for 200 consecutive veterans from 10/08-11/20/2024: age, sex, race, BMI, smoking history, OSA history, sleep medicine referral history, STOP scores, and sleep medicine referral outcomes.

Results: The mean age of veterans was 70 years. 178 (89%) were male and 163 (82%) were white with a mean BMI of 30.71 kg/m². The mean pack-year smoking history was 33 years. The STOP questionnaire was not administered to 120 (60%) veterans; 100 had known OSA, 9 were previously referred to sleep clinic, and 11 declined. 80 veterans were screened for OSA; 50 (62.5%) were high risk (score ≥ 2). 13 (26%) high-risk veterans were referred to sleep medicine. 5 (~40%) were diagnosed with OSA and started on CPAP, 5 had not completed a sleep study at the time of data review, 2 were started on non-invasive ventilation due to known chronic respiratory failure, and 1 was referred for CBT-I.

Conclusion: Implementing OSA screening in the PFT lab is an effective strategy to detect veterans at high risk for OSA. Given the adverse impact of OSA among veterans with comorbid conditions, efforts to expand screening are greatly needed. Further research is required to improve diagnostic testing for veterans at high risk for OSA.

Support (if any):

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0532

SEX DIFFERENCES IN SYMPTOM PROFILES IN MODERATE TO SEVERE OBSTRUCTIVE SLEEP APNEAStuti Vaidya¹, Seyed Nouraei¹, Douglas Wallace², William Wieland³, Amy Sawyer³, Sanjay Patel⁴¹University of Pittsburgh, ²University of Miami, ³University of Pennsylvania, ⁴Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: Obstructive sleep apnea (OSA) can present differently by sex. However, prior studies have considered only a limited range of symptoms and often focused on mild OSA. We sought to compare a broader range of symptoms in women and men seeking treatment for moderate-to-severe OSA.

Methods: Adults diagnosed with moderate-to-severe obstructive sleep apnea initiating continuous positive airway pressure (CPAP) were recruited across two clinical sites to complete online questionnaires before treatment. Visual analog scales (VAS) assessed snoring, nocturnal gasping, nasal congestion, nocturia, headaches, nightmares and acid reflux while PROMIS instruments assessed sleep disturbance, sleep-related impairment, cognitive function, depression, anxiety, anger, fatigue and satisfaction with social roles. Sex differences were compared using t-tests. A cluster analysis was performed using all 15 symptom domains with normalized scores to classify patients based on symptom profile.

Results: We recruited 407 patients (38% women, 62% men). Mean age was similar by sex (women: 50 $\pm$ 14 years vs. men: 48 $\pm$ 15 years). Median AHI was lower in women (25 [IQR: 19-45] vs. 35 [IQR 22-52] events/hr, $p < 0.001$). Despite lower AHI, women reported higher VAS scores for nocturia (5.6 $\pm$ 0.2 vs. 4.9 $\pm$ 0.2, $p=0.02$), headache (4.3 $\pm$ 0.3 vs 3.0 $\pm$ 0.2, $p < 0.001$), and nightmares (2.6 $\pm$ 0.2 vs. 1.9 $\pm$ 0.2, $p=0.02$), as well as worse PROMIS t-scores for sleep disturbance (58.7 $\pm$ 0.6 vs. 56.6 $\pm$ 0.5, $p < 0.001$), sleep-related impairment (62.0 $\pm$ 0.7 vs. 59.3 $\pm$ 0.6, $p < 0.001$), anxiety (54.9 $\pm$ 0.8 vs 52.4 $\pm$ 0.7, $p=0.02$), anger (54.6 $\pm$ 0.9 vs. 51.4 $\pm$ 0.8, $p=0.01$), fatigue (61.3 $\pm$ 0.7 vs. 56.5 $\pm$ 0.5, $p < 0.001$), cognitive function (40.8 $\pm$ 0.7 vs. 37.2 $\pm$ 0.5, $p < 0.001$) and greater dissatisfaction with social roles (40.8 $\pm$ 0.6 vs. 44.0 $\pm$ 0.5, $p < 0.001$). In contrast, no sex differences were observed for snoring, nocturnal gasping, nasal congestion, reflux, or depression. Cluster analysis identified three distinct clusters: 45.8% with higher symptoms across all domains (cluster 1), 27.2% with lower symptoms across all domains (cluster 2), and 27.0% with high airway symptoms but low sleep and mental health symptoms (cluster 3). Women were over-represented in cluster 1 (43% women) but under-represented in cluster 2 (31%) and cluster 3 (32%).

Conclusion: Women with moderate-to-severe OSA initiating CPAP experience greater symptom burden than men. The impact of OSA treatment on improving diverse symptoms by sex needs to be evaluated.

Support (if any): AASM Foundation

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0533

SYMPTOM-BASED IDENTIFICATION OF LOW AROUSAL THRESHOLD IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEADiana Stachula¹, Katie Carlson², Rachel Whelan², Ryan Soose², Thomas Kaffenberger²¹SUNY Downstate, ²University of Pittsburgh

Introduction: Obstructive sleep apnea (OSA) is characterized by recurrent upper airway collapse and sleep fragmentation. A low respiratory arousal threshold (AT), defined as awakening easily to respiratory events, contributes to poor sleep quality and reduced adherence to OSA therapies. AT can be estimated from sleep studies, but it influences patient symptoms remains unexplored. Our aim was to identify symptoms related to low AT.

Methods: From consecutive new patients presenting to an otolaryngology sleep clinic, we collected a standardized questionnaire that combined a sleep history with Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), Nasal Obstruction Symptom Evaluation (NOSE). Our inclusion criteria were adult patients who completed this questionnaire and a home sleep study (HST) between 12/1/24-3/31/25. Patients without OSA were excluded. Patients were categorized as low AT or high AT based on their HST report using a validated screening tool that assigns one point for: AHI < 30, nadir oxygen saturation > 82.5%, and hypopneas comprising > 58.3% of respiratory events. A total score ≥ 2 indicates low AT. Group differences in questionnaire scores were evaluated using Wilcoxon rank sum and chi-square tests. Logistic regression models were constructed to identify independent predictors of low AT.

Results: 129 patients were included. In univariate analyses, low AT was significantly associated with longer subjective sleep latency (median 20.0 min vs 13.8 min; $p=0.041$), higher ISI scores reflecting worry or distress about sleep difficulties (Question #6; median 2.5 vs 2.0; $p=0.044$), and lower ESS scores for sitting inactive in a public place (Question #3; 0.0 vs median 1.0; $p=0.029$). In multivariable regression adjusting for AHI, ISI Q6 and ESS remained independent predictors of low AT. Upon adjustment, NOSE scores for nasal obstruction were also found to be significantly associated with low AT (Question #2; OR 1.08, 95% CI 1.00–1.16, $p=0.041$).

Conclusion: Within our cohort, patients with a low AT were more likely to report distinct symptoms: longer subjective sleep latency, more worry about sleep, and greater nasal congestion. These findings suggest that symptom-based screening may help identify patients with OSA who have a low AT.

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0534

SYSTEMATIC EVALUATION OF RESPIRATORY AROUSAL LATENCY IN SLEEP APNEA

Francis Sgambati¹, Luu Pham², Jonathan Jun³

¹Johns Hopkins University, ²Johns Hopkins, ³Johns Hopkins University School of Medicine

Introduction: Sleep apnea is characterized by episodes of apneas and hypopneas, often triggering cortical arousals associated with the resumption of breathing. The timing of these arousals has not been rigorously studied, leading to inconsistencies in the characterization of sleep disordered breathing and its impact on sleep continuity and clinical outcomes. Our objective was to characterize respiratory arousal latency within a well-defined sleep apnea research cohort.

Methods: Patients with a history of moderate to severe sleep apnea participated in two research sleep studies: one polysomnography (PSG) while on CPAP and the other after a three-night CPAP withdrawal, in a randomized order. The analysis included data from 127 participants (mean age: 53.1±11.4, male:female: 86:41, mean AHI: 57.9±31.0) on the last night of their CPAP withdrawal. The dataset included 20,510 apneas, 21,227 hypopneas, and 27,578 EEG arousals. Respiratory arousal latency (RAL) was defined as the time interval, from (A) the end of an apnea or hypopnea to, (B) the onset of the subsequent EEG arousal. We identified A and B time markers utilizing a moving analysis window spanning 10 seconds prior to the end

of each event and extending 20 seconds post-event termination. The influence of respiratory event types, sleep stage, and event severity (SpO₂ % desaturation, event length) was examined using linear mixed effects models.

Results: RAL following hypopneas have modeled Beta estimates of 2.23s [1.94,2.52] after the event (mean [CI]; $p < 0.001$). Central and obstructive apneas were significantly prolonged compared to hypopneas, 2.91s [2.36,3.45] and 2.42s [2.02,2.82], respectively ($p < 0.001$). Mixed apneas and central hypopneas were significantly prolonged by 2.31s [1.82,2.8] and 2.74s [1.84,3.65], respectively ($p < 0.001$). More severe hypoxia or longer SDB events had shortened latencies ($p < 0.001$). RAL for stage N2 estimated to be 2.23s [1.94,2.52] after the events ($p < 0.001$). Stage N1 had a shortened latencies compared to N2, 2.00s [1.61,2.39] ($p < 0.001$), while N3 and REM had prolonged latencies of 2.69s [2.11,3.27] and 2.56s [2.12,3.01] ($p < 0.01$), respectively.

Conclusion: RAL differs between event types, sleep stage, event duration and severity of SpO₂ desaturation.

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0535

THE EFFECT OF POSITIONAL DEPENDENCY ON OBESITY-RELATED WORSENING OF OBSTRUCTIVE SLEEP APNEA

Su-Hyun Han, Nupel Kara

Chung-Ang University College of Medicine

Introduction: Positional obstructive sleep apnea (OSA) (POSA) is a common phenotype in which airway obstruction is significantly increased during supine sleep. Obesity can increase OSA severity, and in this study, we hypothesized that the effect of obesity may be different depending on the positional phenotype of OSA.

Methods: This retrospective, cross-sectional study involved newly diagnosed OSA patients (apnea-hypopnea index [AHI] $\geq 5/h$) undergoing full-night polysomnography. The POSA group included patients with a supine AHI more than twice the non-supine AHI. We compared clinical characteristics across four subgroups: POSA without obesity (POSA-N), POSA with obesity (POSA-O), NPOSA without obesity (NPOSA-N), and NPOSA with obesity (NPOSA-O). The relationship between body mass index (BMI) and AHI in both groups, POSA and NPOSA (non-positional OSA), was analyzed using multivariate linear regression. We used analysis of covariance (ANCOVA) in order to find out the way positional dependency, obesity, and their interaction affected AHI.

Results: A total of 630 patients (mean age 52.2 $\pm$ 15.1 years; 72.5% male) were included, with 71.1% classified as POSA and 28.9% as NPOSA. Mean AHI was significantly higher in the NPOSA-O (69.1 $\pm$ 28.5) than in the other three groups (POSA-N 26.2 $\pm$ 14.7; POSA-O 35.6 $\pm$ 21.3; NPOSA-N 40.1 $\pm$ 26.6). Multivariate regression demonstrated BMI as an independent risk factor for AHI in both POSA ($B = 0.361$, $p < 0.001$) and NPOSA ($B = 0.509$, $p < 0.001$). A significant interaction between obesity and positional dependency on AHI was observed ($F = 23.48$, $p < 0.001$), indicating that obesity increases OSA severity more in patients with NPOSA than POSA.

Conclusion: Obesity-related OSA severity increase was more prominent in NPOSA than POSA. BMI and positional dependency can be used to stratify risk and improve individualized treatment strategies.

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0536

THE DIAGNOSTIC YIELD OF A STRUCTURED COMORBIDITY WORKUP IN A REAL-LIFE OSA OUTPATIENT POPULATION

Xiaolei Zhang

National Respiratory Disease Research Center, China Japan Friendship Hospital

Introduction: Obstructive sleep apnoea (OSA) is a highly prevalent sleep-related breathing disorder with systemic complications, which exerts important effects on health burden and also influence the management strategies. However, evidence-based recommendations on systematic comorbidity screening approaches remain sparse.

Methods: This single-centre prospective observational study included patients diagnosed with OSA at the sleep center and evaluated the diagnostic yield of a structured comorbidity workup, including laboratory testing, electrocardiogram, echocardiography, abdominal ultrasound, ambulatory blood pressure monitoring, spirometry, and questionnaires.

Results: A total of 1904 OSA patients (age 46±12 years, 82% male) were included. Prior to the diagnostic workup, patients presented with a medical history of a median of two [IQR 1-2] comorbidities and a mean of two [IQR 1-2] new comorbidities were diagnosed with the protocolled workup. Overall, the most prevalent comorbidities were hypertension (30%), dyslipidaemia (55%), non-alcoholic fatty liver disease (29%), metabolic syndrome (31%), type 2 diabetes mellitus (32%), hyperuricemia (29%), heart failure with preserved ejection fraction (13%), significant coronary artery disease (15%), arrhythmia (16%), obesity hypoventilation syndrome (19%), chronic obstructive pulmonary disease (8%) and anxiety or depression (17%), gastro-oesophageal Reflux Disease (17%), asthma (12%), and thyroid dysfunction (6%). In multi variable regression analysis, older age, male sex and mean pulse oxygen saturation were independently associated with a greater number of total comorbidities. Of all newly diagnosed comorbidities, 40% prompted initiation or adjustment of pharmacological therapy, 54% led to specialist referral, and 85% resulted in lifestyle or behavioral interventions.

Conclusion: A structured, comprehensive comorbidity workup in real-life OSA outpatients identifies a high prevalence of previously unrecognized, clinically actionable conditions, most commonly cardiometabolic complications. Integrating such screening into routine OSA care may provide an opportunity to improve risk stratification, treatment strategy optimization, and adverse outcomes prevention.

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0537

UNDERSTANDING FACTORS THAT INFLUENCE THE SHORT-TERM RELIABILITY OF OBSTRUCTIVE SLEEP APNEA SYMPTOM SUBTYPES

Nathan Nesbitt¹, Michael Koenig¹, Brendan Keenan², Peter Cistulli³, Nigel McArdle⁴, Bhajan Singh⁵, Diego Mazzotti⁶, Fang Han⁷, Liyue Xu⁷, Gonzalo Labarca⁸, Thomas Penzel⁹, Allan Pack², Ulysses Magalang¹

¹The Ohio State University Wexner Medical Center, ²University of Pennsylvania, ³University of Sydney, ⁴Charles Perkins Centre, Faculty of Medicine and Health, ⁵Sir Charles Gairdner Hospital, ⁶University of Kansas Medical Center, ⁷Peking University People's Hospital, ⁸Pontificia Universidad Católica de Chile, ⁹Charité - Universitätsmedizin Berlin

Introduction: Multiple studies from clinical and population samples have established the existence of symptom-based subtypes of OSA. An important step towards clinical translation is understanding factors influencing the short-term reliability of these subtypes. We describe new results from an ongoing study in the Sleep Apnea Global Interdisciplinary Consortium (SAGIC) to answer this question.

Methods: Subjects with newly diagnosed OSA completed a questionnaire on symptoms twice (at least two weeks apart) prior to therapy. Symptom subtype at each timepoint was determined based on questionnaire responses using a prediction model derived in existing SAGIC patients. To understand short-term reliability, we calculated simple kappa coefficients indicating slight (0.00-0.20), fair (0.21-0.40), moderate (0.41-0.60), substantial (0.61-0.80), and almost perfect (0.81-1.00) reliability and percent agreement. Logistic regression was performed to evaluate factors associated with the likelihood of falling into different subtypes at the two timepoints.

Results: Data included 394 SAGIC participants from Ohio State (n=101), Kansas (n=20), Sydney (n=82), Perth (n=58), Germany (n=15), Chile (n=23), and Beijing (n=95). At the first visit, 123 (31.2%) participants had the disturbed sleep subtype, 180 (45.6%) were minimally symptomatic, and 91 (23.1%) were excessively sleepy. At the second visit 128 (32.5%) participants had the disturbed sleep subtype, 191 (48.5%) were minimally symptomatic, and 75 (19%) were excessively sleepy. Overall, 76.9% of participants had the same subtype at both timepoints and the kappa was 0.64, indicating substantial reliability. Patients whose initial subtype determination was more certain (e.g., a higher predicted probability) and those initially reporting the minimally symptomatic subtype were more likely to have the same subtype at the next assessment, whereas those with higher BMI were more likely to change subtypes; age, gender, and site were not significantly associated with reliability.

Conclusion: While recruitment is ongoing across all SAGIC sites, this analysis suggests substantial reliability of symptom subtypes over a short timeframe (without treatment). Patients whose initial subtype was predicted more confidently and those with the minimally symptomatic subtype were more likely to report the same subtype at follow-up. This further supports the potential clinical utility of symptom subtypes in advancing more personalized patient care.

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0538

UNTREATED OBSTRUCTIVE SLEEP APNEA CONTRIBUTES TO MORTALITY IN PATIENTS WITH GROUP 1 PULMONARY HYPERTENSION

Kshama Bhyravabhotla¹, Zeynep Seckin², Charles Burger¹, Gonzalo Labarca Trucios¹, Emir Festic¹

¹Mayo Clinic Jacksonville, ²Mayo Clinic Rochester

Introduction: The World Health Organization (WHO) has categorized pulmonary hypertension (PH) in five groups. Obstructive

sleep apnea (OSA) is an independent cause of group 3 PH. The prevalence of OSA in PH patients is approximately 20% and untreated OSA may contribute to pulmonary vascular remodeling, exacerbating PH. Regular use of positive airway pressure (PAP) can improve pulmonary artery pressures. We hypothesized that untreated OSA is associated with mortality in all five groups of PH, and that mortality is reduced with PAP therapy.

Methods: We performed a retrospective chart review of the PH patient registry at Mayo Clinic Jacksonville, comprised of 696 patients classified per WHO classification of PH. Mortality in each WHO group of PH was abstracted as well as the presence of OSA as a comorbidity. Compliance with positive airway pressure therapy (PAP) was assessed across all patients with OSA.

Results: Patients in the registry were followed for a mean of 101.2 months. The mortality across all groups was 36.8%, ranging from 22.6% in group 4 to 64.3% in group 5. OSA was present in 46.9% patients, and it ranged from 33% in group 5 to 58% in group 2. Mortality did not vary significantly in the patients with OSA versus those without OSA ($p=0.56$). Of patients with OSA, 45.9% was deemed compliant with PAP therapy. Overall, the compliant patients had reduced mortality compared to the noncompliant ones ($p=0.045$), however this significance was due to pronounced effect in group 1 patients only.

Conclusion: Almost half of PH patients from our registry had OSA. Compliance with PAP therapy was associated with lesser mortality, primarily due to the effect seen in Group 1 PH patients.

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0539

OBSTRUCTIVE SLEEP APNEA MANAGEMENT IN PRACTICE: REAL-WORLD TREATMENT PATTERNS HIGHLIGHT PERSISTENT GAPS IN CARE

Chris Schmickl¹, Kristina Yu², Bret Zeldow³, Junhui Zhao³, Ana Sanchez-Azofra², Scott Bunner³, John Cronin², John Yee², Danny Eckert⁴

¹Division of Pulmonary, Critical Care, Sleep Medicine and Physiology, University of California, San Diego, ²Apnimed, Inc., ³Genesis Research Group, ⁴Flinders Health and Medical Research Institute/Adelaide Institute for Sleep Health, College of Medicine and Public Health, Flinders University, Bedford Park

Introduction: First-line treatment for obstructive sleep apnea (OSA) is positive airway pressure (PAP). However, adherence is variable and uptake of alternate and emerging non-PAP therapies is unclear. The proportion of people diagnosed with OSA who do not commence or discontinue treatment and the influence of OSA severity on treatment patterns in the real-world setting has been minimally investigated. We aimed to characterize real-world treatment patterns in people with newly diagnosed OSA.

Methods: This retrospective study analyzed adults with newly diagnosed OSA (ICD-10-CM codes) in Optum Market Clarity, a de-identified database linking electronic health records with medical and pharmacy claims (2016-2024). Eligibility: apnea-hypopnea index (AHI) within 180 days of OSA index date and health plan enrollment ≥ 12 months before and after diagnosis. Treatment patterns were analyzed during the 12-month follow-up, stratified by OSA severity per AHI (events/h): mild ($5 < 15$), moderate ($15 < 30$), severe (> 30).

Results: 11,627 people with newly diagnosed OSA were included: mild (36%), moderate (27%) and severe (37%). Mean $\pm$ SD age 57 $\pm$ 14

years, 57% male, 63% commercial, 27% Medicare and 10% other/no insurance, with similar comorbidities across OSA severity categories. PAP was the most common initial prescribed therapy: 59% mild, 65% moderate and 72% severe ($p < 0.001$). Rates of initial therapy with hypoglossal nerve stimulation (0.1%) and oral/dental appliances were low (1.1%). Many received no OSA-specific treatment: 40% mild, 33% moderate and 27% severe ($p < 0.001$). Among PAP users, mean time from incident OSA diagnosis to first PAP device claim was 90 $\pm$ 76 days, with 49% discontinuing therapy during the first year regardless of severity. Concomitant sleep-promoting agents were more frequently used in mild OSA (15%) compared to moderate (13%) and severe patients (12%, $p < 0.001$); wakefulness-promoting agents were used by only 3%, with higher proportion in mild OSA ($p=0.013$).

Conclusion: In this large US cohort, PAP was the predominant initial therapy, with increasing use by OSA disease severity. However, high rates of non-treatment and PAP discontinuations across the OSA disease severity categories indicate that many people with OSA remain untreated. These novel findings underscore the need for targeted interventions to improve timely access, adherence, and long-term management of OSA.

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0540

VARYING HYPOPNEA DEFINITIONS AND MISSED TREATMENT OPPORTUNITIES IN OBSTRUCTIVE SLEEP APNEA

Hnin Oo¹, Zhao Helen Wu², Dashun Liu², Jyoti Lenka³, Narinder Maheshwari¹, Adrian Salmon¹

¹UConn Health, ²University of Connecticut, ³VA Southern Nevada Healthcare System

Introduction: The definition of hypopnea, and by extension the calculation of the apnea-hypopnea index (AHI), may vary based on insurance status, raising important ethical concerns and treatment implications. The aim of this study is to compare two definitions of hypopnea: $\geq 4\%$ decrease in the oxygen saturation (4% criterion) vs $\geq 3\%$ decrease in the oxygen saturation or an arousal (3% criterion) in the diagnosis, severity determination and potential missed treatment opportunities in obstructive sleep apnea (OSA).

Methods: A post-hoc secondary cross-sectional analysis was conducted using data from the MESA Sleep Ancillary Study cohort. The dataset was obtained from the National Sleep Research Resource (NSRR). Concordance/discordance between the two hypopnea criteria used to calculate the AHI were determined using chi square tests of independence and effect size determined using Cramér's V. Comparisons include diagnosis and severity of OSA and potential treatment eligibility with CPAP and Tirzepatide. Subgroup analyses examined variations by age, sex and race/ethnicity.

Results: Among 2057 participants analyzed, the mean age was 69.6 years (SD 9.1), 53.6% were female, 36.1% White, 27.9% Black, 12.2% Asian, 23.9% Hispanic and average BMI was 28.7kg/m². Overall, 60% were reclassified using the 4% criterion resulting in either a downgrade in severity or loss of diagnosis as compared to the 3% criterion. Among those with mild OSA using the 3% criterion ($n=622$), 71.1% were reclassified as no OSA; among moderate OSA ($n=609$), 28% were downgraded to no or mild OSA; among

severe OSA ($n=611$), 49.8% were downgraded to a lower severity category. In addition, 61.3% of participants eligible for CPAP using the 3% criterion became ineligible using the 4% criterion ($p < 0.0001$, Cramér's $V = 0.63$). Potential Tirzepatide eligibility decreased by 35.2% when using the 4% criterion. Discordance was significantly higher among females (65.9% vs 57.5%, $p=0.0018$).

Conclusion: The 4% criterion leads to substantial underdiagnosis and treatment misclassification, disproportionately affecting females and with discordance across all severity categories. Standardizing the hypopnea definition to the 3% criterion across all payers may improve diagnostic consistency, expand access to effective therapies, and promote health equity in OSA care.

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0541

RACIAL/ETHNIC DISPARITIES IN LINKS OF OBSTRUCTIVE SLEEP APNEA DIAGNOSIS AND TREATMENT WITH COGNITIVE IMPAIRMENT IN MIDDLE-AGED AND OLDER ADULTS

Marc Kaizi-Lutu¹, Chunyu Liu¹, Emerson Wickwire², Jennifer Albrecht², Atul Malhotra³, Alden Gross¹, Halima Amjad¹, Chien-Yu Tseng⁴, Xiaowen Chen¹, Marcela Blinka¹, Vishaldeep Kaur Sekhon¹, Adam Spira⁵, Christopher Kaufmann⁴

¹Johns Hopkins University, ²University of Maryland School of Medicine, ³UC San Diego Health, ⁴University of Florida, ⁵Department of Mental Health, Johns Hopkins Bloomberg School of Public Health

Introduction: Obstructive sleep apnea (OSA) is linked to cognitive impairment, and racial/ethnic disparities exist in both OSA and dementia. We previously identified disparities in OSA diagnosis and treatment among middle-aged and older adults in the Health and Retirement Study (HRS). Here, we tested whether the association between OSA diagnosis/treatment status and incident cognitive impairment differed by race/ethnicity.

Methods: Data came from the 2016-2020 waves of the HRS, a nationally representative study of middle-aged and older adults in the United States. We included participants who had probable or diagnosed OSA in 2016 determined by a modified STOP-Bang measure or self-reported OSA diagnosis. Self-reported OSA treatments included CPAP, oral appliance, and surgery. We classified participants as: probable-undiagnosed OSA (i.e., no self-reported diagnosis and met criteria for probable OSA on the modified STOP-Bang); diagnosed-untreated OSA; or diagnosed-treated OSA. Our outcome was a diagnosis of either cognitively impaired, no dementia (CIND) or dementia per the Langa-Weir Classification of Cognitive Function in waves 2018 and 2020. We assessed the association of OSA diagnosis/treatment status with incident cognitive impairment using generalized estimating equations. Effect modification by race/ethnicity (Hispanic/Latino, Non-Hispanic Black (NHB), Non-Hispanic White (NHW), Non-Hispanic Other Race) was assessed via an interaction term.

Results: We studied 3,881 participants who had probable or diagnosed OSA and were cognitively unimpaired in 2016 (mean 63.0±9.7 years, 52.6% female, 40% minoritized race/ethnicity). Among probable-undiagnosed OSA participants: compared to NHW participants, NHB and Hispanic/Latino participants had 105% (OR=2.05, 95% CI 1.48, 2.84) and 48% (OR=1.48, 95% CI 1.02, 2.11) higher odds of cognitive impairment, respectively. In main effects, diagnosed-treated participants had 22% lower

odds of incident cognitive impairment compared to probable-undiagnosed OSA participants (OR=0.78, 95% CI 0.61, 0.99). We found evidence for potential effect modification by race/ethnicity (p for interaction = 0.051). Among NHB participants, diagnosed-treated participants had 54% lower odds of incident cognitive impairment than probable-undiagnosed participants (OR=0.46, 95% CI 0.27, 0.79); these associations were non-significant in NHW and Other racial/ethnic groups.

Conclusion: Undiagnosed NHB and Hispanic/Latino individuals with OSA may be at increased risk for cognitive impairment. NHB individuals may have particularly strong cognitive benefits from OSA treatment.

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0542

ACCURACY AND PREDICTIVE VALUE OF A PAD SLEEP MONITORING DEVICE COMPARED WITH IN-LAB POLYSOMNOGRAPHY

Emory Steelman¹, Eric Reid¹, Melissa Palomino², Lourdes DelRosso³

¹University of California San Francisco, Fresno, ²Inspire Health Sleep Center, ³University of California San Francisco

Introduction: Wearable and nearable sleep-monitoring devices are rapidly expanding in clinical and consumer settings, yet their accuracy relative to in-lab polysomnography (PSG) remains incompletely validated. This study evaluated the agreement, predictive value, and clinical performance of a novel photoplethysmography-based activity device (PAD) compared with the gold-standard PSG.

Methods: Fifty-nine nights of paired PAD and PSG recordings were analyzed. Measures from the PAD included subjective sleep quality score (SQS), total sleep time (TST 1), sleep latency (SL 1), heart rate (HR 1), movement minutes, heart rate variability (HRV), interruptions, and device-derived AHI. PSG outcomes included TST 2, SL 2, sleep efficiency (SE), wake after sleep onset (WASO), periodic limb movement index (PLMI), AHI 2, and HR 2. Paired t-tests compared device outputs. Pearson correlation coefficients assessed relationships between PAD and PSG metrics. Linear regressions were used to determine whether PAD-derived variables predicted PSG outcomes.

Results: PAD significantly overestimated sleep duration and onset latency. PAD-TST 339.1 ± 106.6 min vs PSG-TST 306.6 ± 107.5 min ($t=2.45$, $p=0.017$), PAD-SL (48.9±27.0 vs 21.3 ± 26.0 min; $t=5.97$, $p<0.001$). AHI showed no meaningful device difference (17.5 ± 18.8 vs 17.1 ± 19.1 events/hr; $p=0.898$), and heart rate was similar (64.4 ± 6.7 vs 66.1 ± 12.3 bpm; $p=0.207$). SQS strongly correlated with PSG-TST ($r=0.56$, $p<0.0001$), SE ($r=0.53$, $p<0.0001$), and inversely with WASO ($r=-0.49$, $p=0.0001$), while PAD interruptions correlated with PSG-WASO ($r=0.48$, $p=0.0002$) and PLMI ($r=0.45$, $p=0.0004$). Movement minutes and HRV were weakly or non-related to PSG outcomes (all $p>0.07$). Regression models confirmed predictive utility: SQS independently predicted PSG-TST ($\beta=2.73$, $p=0.0018$) and PSG-SE ($\beta=0.55$, $p=0.0016$), while interruptions predicted WASO ($\beta=10.28$, $p=0.0001$) and PLMI ($\beta=8.21$, $p=0.0007$). The WASO model explained the greatest variance (adjusted $R^2=0.33$), followed by SE (adj $R^2=0.20$) and TST (adj $R^2=0.19$). No PAD variable predicted PSG-AHI (adj $R^2 < 0.01$).

Conclusion: PAD reliably reflects sleep continuity measures (TST, SE, WASO, PLMI) but overestimates sleep latency and duration and does not reflect respiratory severity. With strong correlation

and predictive power for sleep fragmentation, PAD may serve as a clinically useful home-based monitoring tool but should not replace PSG in diagnosing sleep-disordered breathing.

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0543

INFORMING THE DESIGN OF A FEMALE SPECIFIC OSA SCREENING QUESTIONNAIRE THROUGH SYMPTOMS AND AHI-ODI COMPARATIVE MODELLING

Alison Wimms¹, Shuying Yu², Jeff Armitstead¹

¹ResMed, ²Resmed Science Center

Introduction: Women with OSA are frequently underdiagnosed, in part due to sex-specific symptom patterns and milder disease presentation. To address this gap, we developed a female-specific OSA screening questionnaire and conducted a pilot study to understand which characteristics predict OSA risk in women.

Methods: Participants undergoing diagnostic testing for suspicion of OSA at clinics in Australia and the US were asked to complete the female-specific screening questionnaire prior to their sleep study. Least Absolute Shrinkage and Selection Operator (LASSO) regression was applied to identify the most informative predictors of OSA. LASSO was performed separately for data using AHI and ODI as outcomes. Variables selected through LASSO were then entered into two multivariable logistic regression models to assess the likelihood of a patient having a risk of mild OSA (AHI ≥ 5 , ODI ≥ 5). Odds ratios (OR [95% confidence interval]) are reported.

Results: Responses from 437 (39% female; mean age: 48 ± 14 years; age range: 18–86 years) participants have been analyzed. Male gender (vs. female) and higher BMI classification (vs. normal weight BMI) were significant predictors of OSA in both models. Compared to pre-menopausal women, natural post-menopausal (51.02 [3.15, 826.42], $p = 0.006$) women had higher odds of mild OSA risk in the AHI model, but using ODI as a metric revealed that both post- (15.60 [1.43, 170.23], $p = 0.02$) and peri-menopausal women (67.26, [2.98, 1517.21], $p = 0.008$) had higher odds of developing mild OSA compared to pre-menopausal women. When using ODI thresholds as a metric, higher BMI classifications (vs. normal weight BMI) were significant predictors for mild OSA risk.

Conclusion: Our preliminary findings highlight the importance of menopausal stage and BMI to predict OSA risk. The results underscore the importance of sex-specific symptom patterns in OSA assessment and the promise of ODI as a sensitive and complementary metric to AHI in HST studies. Additional data from non-clinical populations are required to improve dataset balance and enhance model generalizability in the development of a female OSA screener.

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0544

NOVEL CONTINUOUS RESPIRATORY METRICS PREDICT SLEEP INSTABILITY ACROSS A LARGE CLINICAL SLEEP COHORT

Thomas Quinn, Elizabeth Han, Thijs Nassi, Eline Oppersma, M. Brandon Westover, Robert Thomas, Wolfgang Ganglberger
Beth Israel Deaconess Medical Center

Introduction: Traditional sleep apnea metrics (e.g. AHI) quantify discrete respiratory events but fail to capture qualitative components of breathing physiology. Our group has developed two novel respiratory pathophysiological biomarkers: Self Similarity (SS) and the Breathing Stability Index (BSI), which quantify respiratory waxing/waning and breath-to-breath stability across the night, respectively. We hypothesized that these measures of respiratory instability will correlate with and predict broader measures of sleep instability.

Methods: We analyzed 24,596 polysomnograms from two large academic medical centers, including diagnostic ($n=13,579$), split-night ($n=5,185$), and titration ($n=5,832$) studies. We compared participants stratified to the highest versus lowest quintile of each respiratory instability marker across sleep variables using two-sample t-tests and Chi-square tests, with effect sizes for interpretable magnitude. A correlation matrix was generated with key sleep-quality variables (N1% sleep, sleep efficiency, wake-after-sleep-onset (WASO), and sleep fragmentation index (SFI)). Finally, we assessed predictive capacity by fitting linear regression models between respiratory instability markers and sleep-quality outcomes.

Results: High SS-indices were associated with poorer sleep quality with higher N1% ($d=0.58$), lower N2%/N3% ($d=-0.13/-0.39$), more WASO ($d=0.38$), lower sleep efficiency ($d=-0.36$), and higher SFI ($d=0.54$) than low SS indices. High BSI's showed similar association across sleep quality markers. The SS-Index was highly associated with BSI ($r=0.43$), as well as N1% ($r=0.24$) and SFI ($r=0.16$). BSI was similarly correlated with N1% ($r=0.24$) as well as SFI ($r=0.23$), sleep efficiency ($r=-0.15$), and WASO ($r=0.15$). A combined linear regression model (SS+BSI) best predicted sleep quality outcomes: sleep efficiency ($\text{adjR}^2=0.095$), N1% ($\text{adjR}^2=0.113$), and SFI ($\text{adjR}^2=0.111$). Both SS and BSI contributed unique, non-redundant information to the models. Age-interaction terms indicated that adverse impacts of respiratory instability on sleep quality increases with advancing age.

Conclusion: Application of two novel respiratory stability markers (SS and BSI) in a large clinical dataset confirmed that high respiratory instability is consistently associated with a characteristic pattern of light, fragmented sleep. SS and BSI correlate moderately with each other but contribute distinct, complementary information. Both SS and BSI independently captured variance related to sleep fragmentation, N1%, WASO, and sleep efficiency and may provide additional information beyond the AHI to guide targeted sleep apnea therapies.

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0545

FROM WAIST TO CALF: MAPPING THE ANTHROPOMETRIC ANATOMY OF HYPOXIC BURDEN

Henrique Terceiro¹, Paula Alana Seixas¹, Laís Mota², Nathalia Lemos¹, Lorenzo Cirri³, Cristina Salles²

¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Royal Brompton Hospital, Guy's and St Thomas NHS Foundation Trust

Introduction: Hypoxic burden (HB) integrates the depth, duration, and frequency of oxygen desaturations and may reflect cardiometabolic risk in Obstructive Sleep Apnea (OSA). Objective:

To evaluate the relationship between anthropometric measurements, HB, and the oxygen desaturation index (ODI) in OSA.

Methods: A cross-sectional analysis was performed in 36 patients, 58.1% women, mean age 53.95 ± 11.86 years. Measurements included Body Mass Index (BMI), ODI, cervical circumference (CC), abdominal circumference (AC), calf circumference (CaC), and HB, calculated as the area under the curve of desaturations > 3%.

Results: The sample presented a mean and standard deviation for BMI of 30.77 ± 8.06, for cervical circumference of 38.51 ± 4.38, for abdominal circumference of 103.59 ± 13.56, for ODI of 20.65 ± 41.29, and for hypoxic burden of 51.30 (ranging from 14.93 to 88.15). The sleep ODI percentile was equivalent to 6.9 (ranging from 1.75 to 18.08). A positive correlation was observed between: AC and HB ($r = 0.662$; $p = 0.001$), AC and sleep ODI ($r = 0.799$; $p = 0.000$), AC and BMI ($r = 0.729$; $p = 0.000$); CC and AC ($r = 0.384$; $p = 0.025$); and AC and CC ($r = 0.510$; $p = 0.002$). The mean of the variables was evaluated according to the abdominal circumference measurement (AC greater than 130 cm vs AC less than 130 cm, respectively), showing: Age (54.41 ± 10.46 vs 51.00 ± 20.14; $p = 0.729$), BMI: (30.17 ± 7.56 vs 35.25 ± 11.53; $p = 0.449$), CC (37.4 ± 3.39 vs 44.67 ± 9.29; $p = 0.336$), CaC (37.94 ± 8.59 vs 41.00 ± 4.24; $p = 0.480$), AC (101.78 ± 11.76 vs 132.50 ± 2.12; $p = 0.000$), and ODI (12.85 ± 13.03 vs 98.65 ± 138.52; $p = 0.537$). Sleep ODI: (11.59 ± 14.09 vs 102.85 ± 145.17; $p = 0.537$), HB (58.26 ± 45.90 vs 441.15 ± 618.22; $p = 0.02$).

Conclusion: AC showed the strongest association with HB, indicating central adiposity better reflects hypoxemia severity than BMI. The data suggest abdominal measures may support risk assessment in OSA.

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0546

A CROSS-POPULATION COMPARISON OF SLEEP-DISORDERED BREATHING IN EUROPEAN AND EAST ASIAN ADULTS

Matthew Salanito¹, Antoine Weihs², Seung Ku Lee³, Chol Shin³, Allan Pack⁴, Thomas Penzel¹

¹Charité - Universitätsmedizin Berlin, ²University of Greifswald,

³Institute of Human Genomic Study, College of Medicine, Korea University, ⁴University of Pennsylvania

Introduction: Sleep-disordered breathing (SDB) is a major global health concern with substantial cardiometabolic consequences, yet its determinants and physiological expression may differ across populations. This study used harmonised data from the Study of Health in Pomerania (SHIP) in Germany and the Korean Genome and Epidemiology Study (KoGES) in South Korea to examine ethnic differences in SDB prevalence, correlates, and metabolic profiles in European and East Asian adults.

Methods: Participants aged 45 years and older with at least four hours of valid sleep data were included. Demographic, anthropometric, behavioural, and cardiometabolic variables were harmonised to ensure comparability. Age and sex distributions were balanced using inverse probability weighting. SDB severity was defined using apnea-hypopnea index thresholds. Regression models with cohort-by-severity interaction terms evaluated population-specific associations, adjusting for age, sex, and waist-to-height ratio (WHtR), selected for its cross-ethnic comparability.

Results: Before adjustment, SHIP participants exhibited higher BMI and WHtR, while KoGES participants showed higher diabetes prevalence and elevated HbA1c. In both cohorts, SDB prevalence

increased with age and was higher in men. Anthropometric indices rose with increasing severity in both populations, but gradients were steeper in SHIP, indicating a stronger adiposity-linked pathway. Cardiometabolic profiles diverged: in SHIP, greater severity was associated with elevated LDL cholesterol, triglycerides, and hypertension, whereas in KoGES it was linked to increased HbA1c and diabetes prevalence. Adjustment for WHtR reduced inter-cohort differences in lipid and blood pressure markers but did not eliminate disparities in glycaemic outcomes, suggesting distinct metabolic susceptibility.

Conclusion: Although central adiposity is a shared determinant of SDB, the physiological consequences of higher severity differ across populations. In the European cohort, SDB was more strongly linked to vascular and lipid-related burden, whereas in the East Asian cohort it was more closely associated with impaired glucose regulation, reflecting heightened glycaemic vulnerability. These population-specific patterns likely stem from differences in fat distribution, metabolic risk, and lifestyle transitions. Overall, SDB manifests through distinct pathways across populations, underscoring the need for tailored screening and management strategies rather than universal clinical models.

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0547

A QUALITATIVE POLICY ANALYSIS OF A SUCCESSFUL LEGISLATIVE EFFORT TO PROVIDE FREE OSA SCREENING IN NEW YORK CITY, NY

Chidera Ejikeme¹, Shaun Abreu², Jalissa Quigley², Rashon Lane³, Katie Stone⁴, Rebecca Robbins⁵

¹Brigham and Women's Hospital Division of Sleep and Circadian Disorders, ²New York City Council, District 7, ³Sutter Health, Center for Health Systems Research, ⁴California Pacific Medical Center Research Institute, ⁵Division of Sleep Medicine, Harvard Medical School

Introduction: In April 2025, The New York City (NYC) Council enacted a groundbreaking law mandating access to free obstructive sleep apnea (OSA) screening for New York residents regardless of insurance coverage. We reviewed local policy development and enactment to provide a framework for other policymakers to model similar laws in their constituencies to promote OSA screening and awareness.

Methods: We conducted an archival analysis of historical records by reviewing NYC Council hearing transcripts and recordings, committee notes, and other legislative materials to understand the process of codifying this bill into law. We also conducted qualitative interviews with two NYC policymakers involved in the bill's success.

Results: The sleep apnea screening bill, Int #1047-B was introduced to the Council by Councilmember Abreu in September 2024. The bill was passed in April of 2025 after amendments from the NYC Council Committee of Health. Regarding elements of the successful legislative effort, we found 7 themes: personal experience of legislators, illuminating gaps in public health data on OSA, emphasizing consequences on untreated OSA, making the consequences of OSA personally relevant, obtaining leadership buy-in, and the importance of timing and connections with the press. Our qualitative analysis revealed 3 themes on the legislative components of the sleep apnea screening bill: public education and outreach, ensuring access for all, and legislating an evaluation of the program. Policymakers also discussed the legislative

components of this screening bill, and the drafting process to promote free OSA screening in New York City. The qualitative analysis provided insights on the legislative process with 5 themes: process of drafting, law codification and implementation, incorporating science into the argument, and the political process.

Conclusion: This work may serve as a model resource for future legislation on OSA screening in other constituencies. In addition, this paper serves as an example of how to utilize scientific literature in government to inform public health policy.

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0548

COMISA SYMPTOM SUBTYPES - A POTENTIAL EXPLANATION OF COMISA-ASSOCIATED CARDIOVASCULAR RISKS

Eric Lam¹, Brendan Keenan¹, Bruno Saconi², Philip Gehrman¹, Allan Pack¹

¹University of Pennsylvania, ²Penn Medicine

Introduction: Obstructive sleep apnea (OSA) is a heterogeneous disorder with regards to the disease presentation and cardiovascular (CV) consequences. On one hand, prior studies have linked Co-Morbid Insomnia and Sleep Apnea (COMISA), characterized by substantial overlap of chronic insomnia and OSA, to elevated CV risk. On the other, studies in community-based and clinical populations have described symptom-based subtypes of obstructive sleep apnea (OSA), including excessively sleepy, moderately sleepy, disturbed sleep, and minimally symptomatic subgroups, and have demonstrated that the excessively sleepy subtype (not the disturbed sleep subtype) carries the highest CV risk. We explored the extent to which this “paradox” between the findings from research on COMISA and symptom subtypes is explained by underlying excessive sleepiness among patients with COMISA.

Methods: We utilized data from the Sleep Apnea Global Interdisciplinary Consortium (SAGIC) to compare the overlap between COMISA and OSA symptom subtypes. COMISA was defined as an apnea-hypopnea index (AHI) ≥ 15 /hour and insomnia by qualitative (problems initiating sleep, staying asleep or waking too early ≥ 3 x/week for ≥ 3 months) and/or quantitative criteria (average sleep onset latency and/or wake after sleep onset exceeding 31 minutes, with symptoms persisted for at least 3 months). We used descriptive statistics to understand the proportion of each symptom subtype within patients with COMISA.

Results: We included 1,929 subjects with OSA (AHI ≥ 5 events/hour), of whom 1,321 (68.5%) had moderate-severe disease (AHI ≥ 15). Among those moderate-severe OSA, 382 (28.9%) subjects had COMISA (19.8% of the full cohort with any OSA). The largest fraction of the patients with COMISA fell into the excessively sleepy subtype ($n=179$ [47%]), with most of the remaining falling into the disturbed sleep subtype ($n=142$ [37%]) and $< 10\%$ in either the minimally symptomatic ($n=31$ [8.1%]) or moderately sleepy ($n=30$ [7.9%]) subtypes.

Conclusion: Nearly half of patients with COMISA in this international, clinical sample had the excessively sleepy OSA symptom subtype previously associated with increased CV risk. Further studies with longitudinal data should investigate whether the elevated CV risk in patients with COMISA is driven by excessive sleepiness.

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0549

CHARACTERIZING NOVEL CONTINUOUS RESPIRATORY INSTABILITY METRICS ACROSS A LARGE CLINICAL SLEEP COHORT

Elizabeth Han, Thomas Quinn, Robert Thomas, Thijs Nassi, Eline Oppersma, M. Brandon Westover, Wolfgang Ganglberger
Beth Israel Deaconess Medical Center

Introduction: Respiratory instability during sleep reflects irregular ventilatory control and may contribute to sleep fragmentation. Traditional sleep apnea metrics, like the apnea-hypopnea index, count discrete events but miss continuous breathing physiology. We developed two novel respiratory-instability markers. Self-Similarity (SS) represents the percentage of respiratory epochs with self-similar patterns, where $< 10\%$ indicates acceptable stability. The Breathing Stability Index (BSI) represents the median breath-to-breath stability across the night, where < 0.5 indicates stable breathing and > 1.5 indicates marked instability. We characterized their demographic patterns across a large clinical dataset.

Methods: We analyzed 24,596 polysomnograms from Beth Israel Deaconess Medical Center (BIDMC) and Massachusetts General Hospital (MGH) (age 55.7 ± 16.7 years, 55.7% male), including diagnostic ($n=13,579$), split-night ($n=5,185$), and titration ($n=5,832$) studies. SS and BSI were computed from respiratory envelopes derived from effort belts, allowing for breath-to-breath amplitude comparison. Sleep measures included N1/N2/N3/REM percentages, sleep efficiency, and sleep fragmentation index (SFI). We examined distributions by study type, demographic associations using correlations and t-tests, and sex and site differences using Cohen's d.

Results: The mean SS was $5.2 \pm 6.9\%$ (range 0-86%) and the mean BSI was 1.06 ± 0.48 (range 0.2-4.8). Instability above clinical thresholds (SS $\geq 10\%$) was evident in all study types, with the highest seen in split night studies: 11% of diagnostic studies (mean BSI=1.00), 11% of titration studies (mean BSI=1.02), and 34% of split-night studies (with 11% exceeding 20%; mean BSI=1.22). Both metrics increased with age ($r=0.17$, $p < 0.001$) in steady, monotonic increments. Men exhibited higher instability (SS $d=0.40$; BSI $d=0.19$) than women. MGH showed higher SS ($d=0.42$) but slightly lower BSI ($d=-0.10$) than BIDMC. The two metrics showed moderate intercorrelation ($r=0.43$), and moderate correlation with N1% ($r=0.24$) and SFI (SS: $r=0.16$; BSI: $r=0.23$), indicating related but non-redundant sleep-instability information.

Conclusion: This large dataset confirmed a high prevalence of SS and warrants further clinical attention. The moderate correlation between SS and BSI ($r=0.43$) confirms they provide complementary insights into breathing control that are otherwise missed by discrete event-based metrics. These measures are now integrated into a larger multicomponent analysis suite to support clinical decision making at BIDMC by enabling more comprehensive assessment of sleep-disordered breathing phenotypes.

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0550

DYNAMIC UPPER AIRWAY MRI (DUAM) OF OSA DURING NATURAL SLEEP IS SUITABLE FOR CLINICAL USE

Junjie Liu¹, Aygun Asgarli¹, Md Shahin Ali², Nicholas Thedens², Douglas Van Daele³, Sajan Lingala²

¹Department of Neurology, University of Iowa, ²Department of Biomedical Engineering, University of Iowa, ³Department of Otolaryngology, University of Iowa

Introduction: Accurate determination of the collapse pattern of upper airway is a prerequisite for some obstructive sleep apnea (OSA) therapies. Dynamic upper airway magnetic resonance imaging (DUAM) is a powerful research tool and can quantify the collapse pattern in high resolution. However, DUAM has not been applied in clinical arena, partly due to a common assumption that MRI is too loud to allow natural sleep. We aim to develop and validate a pragmatic, patient-friendly protocol of DUAM during natural sleep.

Methods: Unselected patients with diagnosed moderate or severe OSA were recruited. Each MRI session started within two hours after the self-reported usual sleep onset time, and comprised 8-minute DUAM scans that acquired multiple axial slices over the upper airway (2x2x6 mm, 0.18 s resolutions), separated by 1-minute technical breaks. Patient was instructed to stay awake for the first DUAM scan, then sleep during all remaining scans. To maximize comfort, only oxygen saturation (SpO₂), pulse rate, chest and abdomen movements were recorded. In post-processing, OSA events were scored as events with $\geq 3\%$ or 2% drops of SpO₂ and concurrent characteristic changes in chest and/or abdomen motion.

Results: Ten patients (age: 33-54 years; all male by coincidence) were recruited as of December 2025. All (100%) completed the study. After the first six 8-minute DUAM scans (including the awake first scan), six patients (60%) showed at least 16 OSA events with $\geq 3\%$ SpO₂ drop (mean: 38, std.: 12 events). For the other patients, when using the criterion of $\geq 2\%$ SpO₂ drop, there were 14, 17, 18, 27 OSA events in each patient respectively. When surveyed after the MRI, patients commonly cited loud noise and back discomfort from having to lie supine as factors that may prohibit sleep.

Conclusion: In unselected patients with moderate or severe OSA, a one-hour MRI session comprising 40 minutes of DUAM with attempted natural sleep sufficiently captures upper airway collapse events with $\geq 2\%$ oxygen desaturation. Thus, DUAM of OSA during natural sleep is clinically practical. While the standard MRI setup is well tolerated, noise abatement and allowing non-supine positions would enhance the patient experience.

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0551

DYNAMIC UPPER AIRWAY MRI (DUAM) OF OSA MAY BE BETTER THAN DISE FOR DETECTING COMPLETE CONCENTRIC COLLAPSE

Sajan Lingala¹, Nicholas Thedens¹, Md Shahin Ali¹, Douglas Van Daele², Aygun Asgarli³, Junjie Liu³

¹Department of Biomedical Engineering, University of Iowa,

²Department of Otolaryngology, University Iowa, ³Department of Neurology, University of Iowa

Introduction: Currently, drug-induced sleep endoscopy (DISE) is mandatory for identifying palatal complete concentric collapse (CCC), which is associated with poor outcomes of hypoglossal nerve stimulation (HNS) therapy in obstructive sleep apnea (OSA). As a major inherent flaw, DISE lacks resolution along the superior-inferior axis of upper airway. We recently developed dynamic

upper airway MRI (DUAM) methods to image at high spatiotemporal resolutions. Here we aim to compare the performance of DUAM against DISE for detecting CCC.

Methods: We recruited patients who previously received DISE to assess their candidacy for HNS. DUAM was conducted during natural sleep in contiguous axial slices (2.0x2.0x6.0 mm, 0.18 s), and OSA events were identified from concurrent physiological measurements. Segmentation of airway lumen by semi-automatic software was visually confirmed for veracity. Similar to the conventions in DISE, we determined the pattern of airway collapse by the changes of lumen contour from the times when the lumen was the smallest or absent.

Results: Six patients were studied by December 2025; four of them showed CCC during DISE. The other two patients both showed anterior-posterior collapse in velopharynx and partial lateral collapse in oropharynx, and both received HNS implants that did not effectively treat OSA. The collapse pattern was consistent across observed (more than 16) OSA events in each patient. In velopharynx and oropharynx, the collapse pattern (CCC vs. anterior-posterior vs. lateral) detected by DUAM was in full accordance with DISE. However, in both patients without CCC during DISE, at least one slice between velopharynx and oropharynx clearly showed CCC, concentric around the inferior part of soft palate. Such CCC could only be detected because the oral cavity space anterior to the soft palate was imaged. The video recorded during DISE was re-reviewed by experienced otolaryngologists and CCC was not identified.

Conclusion: DUAM can detect the CCC restricted to the upper airway segment between velopharynx and oropharynx, because of its high resolution (6 mm) along the superior-inferior axis and its ability to visualize the oral cavity space anterior to the soft palate. Such localized CCC can be missed by DISE and might be associated with negative HNS outcomes.

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0552

ESTIMATING SKIN TONE FROM RED AND INFRARED LIGHT IN EXISTING PULSE OXIMETERS TO CORRECT SKIN TONE-RELATED BIAS

Andrew Wellman¹, Daniel Vena², Scott Sands³, Joao Luiz Gomes Carneiro Monteiro², Neda Esmaeili², Ludovico Messineo⁴, Ali Azarbarzin⁴

¹Harvard, Brigham and Women's Hospital, ²Brigham and Women's Hospital, ³Harvard University, ⁴Harvard Medical School

Introduction: Pulse oximetry (SpO₂) systematically overestimates arterial oxygen saturation (SaO₂) in individuals with darker skin pigmentation. This skin tone bias arises because current calibration algorithms do not account for differences in melanin absorption. A potential solution is to develop skin tone-specific calibration curves, but this requires a reliable way to estimate skin tone, preferably using signals already available in commercial oximeters. Because melanin absorbs red light much more strongly than infrared light, we hypothesized that the ratio of the red to infrared direct current (DC) signals—representing transmitted rather than pulsatile light—could serve as a quantitative estimate of skin tone.

Methods: Sixteen participants were enrolled and categorized using the Fitzpatrick Skin Tone (FST) scale into three groups: light

(FST I-II, $n=5$), medium (FST III-IV, $n=4$), and dark (FST V-VI, $n=7$). Using a Texas Instruments transmission-mode finger probe with fixed LED drive currents, we recorded 5-second segments of raw red and infrared signals. From these signals, the DC components (representing baseline light transmission) were extracted, and the ratio of red(DC) to infrared(DC) was calculated for each participant. This ratio was then compared across skin tone categories.

Results: The red(DC)/infrared(DC) ratio decreased systematically with increasing skin pigmentation. Participants with light skin had ratios >1.0 , indicating greater red than infrared transmission. In the medium group, ratios ranged from 0.6-1.0, consistent with increased red light absorption by melanin. In the dark skin group, most participants had ratios < 0.6 , reflecting substantial red light attenuation. The pattern demonstrates that the DC ratio distinguishes skin tone categories in a manner consistent with melanin's wavelength-dependent absorption.

Conclusion: These data suggest that skin tone can be estimated directly from the red and infrared light signals already present in pulse oximeters. Incorporating such a skin-tone metric could enable skin tone-specific calibration curves and thus substantially reduce or eliminate skin tone bias in pulse oximetry measurements. This work supports the feasibility of a built-in, signal-based method to identify and correct skin tone-related error without requiring additional sensors or external measurement devices. Ongoing analyses will incorporate objective spectrocolorimetric indices, including the Individual Typology Angle, to further validate this approach.

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0553

EXPLORING THE PREVALENCE OF SLEEP TRACKING AND ORTHOSOMNIA IN A NATIONAL SURVEY OF ADULTS IN THE US

Ronan Goel¹, Stuart Quan², Chidera Ejikeme³, Matthew D. Weaver², Joshrick Sablan⁴, Charles Czeisler⁵, Rebecca Robbins¹

¹Division of Sleep Medicine, Harvard Medical School, ²Harvard Medical School, ³Brigham and Women's Hospital Division of Sleep and Circadian Disorders, ⁴The Ohio State University, ⁵Brigham and Women's Hospital

Introduction: Wearable sleep technology has become increasingly small, precise, and affordable. As such technologies become increasingly accessible, concerns about the anxiety-inducing nature of sleep data have arisen, referred to as orthosomnia. In a nationally representative panel of adults in the United States (US), we explore the prevalence of sleep tracking, reasons for tracking, and orthosomnia.

Methods: We conducted a cross-sectional survey using a geographically representative sample of adults in the US. Participants were asked if they track their sleep using a digital tool, why they track, and whether their healthcare provider recommended they track. Those who did not track were asked for their reasons for not doing so. Using a 2-item direct measure adapted from the Patient Health Questionnaire (PHQ)-2 (a validated measure to assess anxiety) to sleep tracking, we explore the prevalence of orthosomnia. Specifically, we adapted the PHQ-2 by asking participants if they felt "nervous, anxious or on edge" or were unable to "stop or control worrying about" data they obtained from their sleep tracker from never (0) to every day (3). Responses were summed then scored so that responses of 3 or higher indicated at risk for orthosomnia.

Results: Participants ($n=1,280$) were on average 47.4 years of age ($sd=17.7$ years), 47.0% female, 78.8% White, and 24.4% earn $< \$25,000$. Among the sample, 32.4% report sleep tracking ($n=415$). Sleep tracking was more common among younger adults ($p<0.001$), males ($p<0.001$), and higher income earners ($p<0.001$). The most common reason for not tracking was "not a priority" ($n=57.6\%$). The most common reason for tracking was improve sleep (70.4%). Among those reporting sleep tracking, 33.0% reported their provider recommended that they do so and 30.9% scored positive for orthosomnia risk.

Conclusion: Approximately 1 in 3 US adults use a digital tool to track their sleep, suggesting a continued increase from previous estimates. This study reveals that more than 30% of adults who track their sleep report symptoms of orthosomnia using our adapted measure, approximately twice the rate reported in prior estimates. Further research is needed to address this unintended consequence of sleep tracking.

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0554

HOW DOES THE FINGER CAPTURE BREATHING? RESPIRATORY MONITORING VIA FINGERTIP IMU

Lily Liu, Jeanne Lin, Hau-Tieng Wu

Courant Institute of Mathematical Sciences, New York University

Introduction: Inertial measurement units (IMUs) are increasingly integrated into home-care and wearable devices. When placed on the fingertip, we observed that IMU accelerometer signals capture subtle peripheral motion associated with respiratory effort. This modality may provide complementary information when traditional respiratory channels are unreliable or unavailable, offering potential value for downstream applications such as obstructive sleep apnea (OSA) screening.

Methods: Tri-axial IMU accelerometer signals were preprocessed by detrending and bandpass filtering to isolate physiologic frequency bands. We modeled each channel as an adaptive non-harmonic oscillation and analyzed it using the synchrosqueezing transform (SST), a nonlinear time-frequency analysis method. The respiratory phase was obtained via ridge extraction of the putative respiratory component encoded in the IMU signal. Phase-based time unwarping was then applied to stabilize nonstationary oscillations and concentrate spectral energy. A Respiratory Quality Index (RQI) was computed from the Fourier transform of the unwrapped signal, defined as the ratio of harmonic respiratory energy to total cardiopulmonary-band energy. Epochs exceeding a predefined RQI threshold were retained for waveform extraction using shape-adaptive mode decomposition (SAMD), a recently developed signal decomposition algorithm capable of recovering nonstationary physiological oscillations. Estimated fingertip-derived respiratory waveforms were compared with reference airflow measurements.

Results: A total of 124 full-night IMU recordings collected using the TipTraQ device were analyzed. A substantial proportion of epochs exhibited high RQI, indicating consistently usable signal quality for respiratory estimation. In high-quality segments, the reconstructed fingertip respiratory waveform showed strong temporal concordance with reference airflow, including high waveform correlation and low respiratory-rate error.

Conclusion: This study demonstrates the feasibility of deriving robust respiratory waveforms from fingertip IMU recordings obtained from wearable devices. The combination of RQI-based quality assessment and SAMD-based waveform reconstruction enables reliable extraction of respiratory dynamics from a single IMU sensor. These findings highlight the potential of fingertip-only IMU monitoring as a complementary or alternative respiratory channel for home-based sleep assessment and OSA screening.

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0555

NEIGHBORHOOD GREEN SPACE AND OBJECTIVE MEASURES OF SLEEP: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS (MESA) SLEEP AND MESA-AIR

Janice North¹, Martha Billings¹, Coralynn Sack¹, Ali Azarbarzin², Susan Redline³, Joel Kaufman¹, Anjum Hajat¹

¹University of Washington, ²Harvard Medical School, ³Brigham and Women's Hospital

Introduction: Obstructive sleep apnea is common yet underdiagnosed, with possible environmental factors contributing to disease risk. The effect of greenspace on sleep apnea, particularly when assessed using polysomnography (PSG), remains understudied.

Methods: We examined associations between residential greenness, measured by the Normalized Difference Vegetation Index (NDVI), and PSG-measured sleep among participants in the Multi-Ethnic Study of Atherosclerosis. We used a repeated cross-sectional design including participants with geospatial data who participated in the Sleep Ancillary Study during Exam 5 (2010–2013) and/or Exam 7 (2022–2024). NDVI was calculated within a 900m buffer around participants' homes; 300m and 1,200m buffers were assessed in sensitivity analyses. Primary outcome was moderate-to-severe OSA (AHI 4% $\geq$ 15 events/hour). Secondary outcomes were proportion of sleep time when arterial oxygen saturation falls below 90% (T90), nadir SpO₂, and oxygen desaturation index (ODI 4%). Sensitivity analyses included AHI 3% $\geq$ 15 and ODI 3%. We applied Generalized Estimating Equations with an exchangeable correlation structure to account for repeated measures. Linear regression models were used for continuous outcomes and Poisson regression with robust standard errors for dichotomous outcomes. Models were adjusted for demographic, socioeconomic, neighborhood, behavioral, and clinical covariates.

Results: The final sample included 2,148 observations from 1,789 unique participants aged 54–95 years. NDVI within 900m was not associated with OSA (PR = 0.98; 95% CI: 0.83, 1.16). However, associations were suggestive at smaller buffers: each interquartile-range increase in annual NDVI within a 300m buffer corresponded to a 9% lower OSA (PR = 0.91; 95% CI: 0.77, 1.08), and for summer NDVI, a 12% lower OSA (PR = 0.88; 95% CI: 0.73, 1.06). No significant associations were observed for secondary outcomes, except for T90 within 900m (Coef = 1.48; 95% CI: 0.1, 2.85), indicating higher NDVI was linked to more time with oxygen saturation below 90% during sleep.

Conclusion: Although estimates include the null, findings suggest a potential inverse relationship between neighborhood greenness and OSA risk at smaller buffers and during summer months. The unexpected positive association with T90 may reflect seasonal or site-specific effect (e.g., vegetation-related allergies exacerbating OSA). Future studies should confirm these findings and clarify underlying mechanisms to inform sleep-friendly urban planning.

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0556

POLYSOMNOGRAPHIC FINDINGS IN HEAVY MACHINERY OPERATORS WORKING IN HIGH-ALTITUDE MINING SITES WITH SUSPECTED SLEEP-RELATED BREATHING DISORDERS

Frank Villarreal¹, Lourdes DelRosso²

¹Clinica Ricardo Palma, ²University of California San Francisco, Fresno

Introduction: High-altitude mining is a major economic activity in countries such as Peru. Mining camps are located in remote areas and require rotational work systems in which operators alternate between day and night shifts under demanding environmental conditions. Exposure to hypobaric hypoxia, prolonged work cycles, and irregular sleep schedules predisposes workers to fatigue and excessive daytime sleepiness. Previous research has reported fatigue in 20–40% of high-altitude miners, and sleepiness has been linked to up to 65% of driving-related incidents. These findings highlight the need to evaluate sleep disorders and fatigue-related risks in this work setting.

Methods: Thirty-eight heavy machinery operators who generated sleepiness alerts while driving at a mining camp located at 4,300 meters above sea level were evaluated. Workers with recurrent alerts detected by a semi-automated fatigue-monitoring system underwent respiratory polygraphy onsite and were later referred to a sea-level Sleep Unit for complete polysomnography. Clinical variables predictive of obstructive sleep apnea (OSA) were analyzed and adjusted for age, sex, and altitude of residence (>3000 m vs. sea level).

Results: Thirty-three valid clinical records were included. OSA was diagnosed in 17 workers (51.5%): 47.1% mild, 41.2% moderate, and 11.8% severe. CPAP therapy was prescribed for 13 patients; one received a mandibular advancement device, and three were managed expectantly. Compared with non-OSA individuals, patients with OSA had higher BMI (29.8 vs. 26.1 kg/m²), higher Epworth scores (11.2 vs. 7.8), and higher STOP-BANG values (4.9 vs. 3.2). STOP-BANG (OR 1.45), Epworth (OR 1.21), and BMI (OR 1.18) were significantly associated with OSA. After adjustment for altitude, STOP-BANG (OR 1.52) and BMI (OR 1.28) remained significant predictors, whereas Epworth did not.

Conclusion: High-altitude machinery operators with repeated sleepiness alerts showed a high prevalence of OSA, with most requiring treatment. STOP-BANG and BMI were the strongest predictors of OSA after adjusting for altitude of residence. These findings support systematic screening for sleep disorders in high-altitude mining environments.

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0557

PSYCHOMETRIC ASSESSMENT OF SEX DIFFERENCES IN THE EPWORTH SLEEPINESS SCALE IN A SLEEP CLINIC POPULATIONJonna Morris¹, Faith Luyster², Diego Mazzotti³, Paul Scott¹¹University of Pittsburgh, ²University of Pittsburgh School of Nursing, ³University of Kansas Medical Center

Introduction: The Epworth Sleepiness Scale (ESS) measures subjectively reported behaviors of daytime sleepiness but has never been fully validated in women. Given documented sex differences in sleep symptoms, sleep physiology, and daytime function, questions have emerged about whether the ESS measures daytime sleepiness similarly in women and men. This study aimed to examine sex differences in the psychometric properties of the ESS, including an item-level analysis.

Methods: We conducted a retrospective analysis of the eight-item ESS collected from the electronic medical records of sleep study patients. Items measure the likelihood of falling asleep while 1) sitting and reading; 2) watching tv; 3) sitting in a public space; 4) a car passenger; 5) lying down in the afternoon; 6) sitting and talking; 7) sitting quietly after lunch; 8) stopped in traffic. We used confirmatory factor analysis to assess the ESS's unidimensional structure and to compare congeneric (unequal item weights) and tau-equivalent (equal weights) models. Measurement invariance by sex was tested at the configural, metric, and scalar levels using Satorra-Bentler scaled chi-square tests. Sex differences in item responses were examined using Rao-Scott chi-square tests.

Results: The sample included 3,277 adults (women: n=1,730, 52.8%; men: n=1,547, 47.2%), was predominantly White (88.4%), with a mean age of 61.6 years (SD=14.7) and mean BMI of 33.4 kg/m² (SD=8.0). Despite variation in item loadings, the ESS showed a clear unidimensional structure by sex. However, the findings indicated metric invariance ($\Delta\chi^2 = 5.22$, df = 7, p = 0.63) but not scalar invariance, suggesting structural model comparisons are valid, but individual ESS scores may not be directly comparable. Significant sex differences were found for items 1, 2, 3, 4, 6, and 8 (Rao-Scott χ^2 range: 9.87–93.67; p = 0.032 to < 0.001) but not items 5 and 7.

Conclusion: The ESS remained a unidimensional measure for both women and men, though several items showed sex-specific response differences that offset each other. Depending on the research question, investigators should consider sex and item-level variation when using the ESS to assess daytime sleepiness.

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0558

THE SPECTRUM OF SLEEP DISTURBANCES IN DIFFICULT-TO-TREAT ASTHMA: PREDOMINANCE OF SLEEP-DISORDERED BREATHING

Kristina Zihnerl, Peter Kopač, Irena Sarc

University Clinic for Respiratory and Allergic Diseases Golnik

Introduction: Sleep problems are common in individuals with asthma, and several nocturnal symptoms overlap with asthma-related manifestations. Evidence indicates that sleep disorders

may contribute to poor asthma control or signal suboptimal disease management. This study aimed to determine the prevalence and spectrum of sleep disorders in patients with difficult-to-treat asthma and to identify sleep-related factors associated with poor disease control.

Methods: This prospective single-centre study was conducted at the University Clinic Golnik. Consecutive patients with difficult-to-treat asthma were recruited from a multidisciplinary outpatient clinic between August 2022 and February 2024. Polysomnography was performed during clinical stability, and medical records were reviewed.

Results: A total of 142 patients were enrolled (53% male, mean age 58.5 ± 12.6 years). Sleep disturbances were highly prevalent across multiple domains. Patients reported snoring (33%), breathing pauses (27%), night awakenings (60%), night cough (42%), nocturia (67%), restless leg syndrome symptoms (41%), restless sleep (34%), unrefreshed sleep (34%), and morning headaches (18%). Polysomnography showed prolonged sleep latency in 68%, prolonged wake after sleep onset in 86%, suboptimal sleep efficiency in 78%, an arousal index >15/h in 53%, and a periodic leg movement index >15/h in 44%. Sleep-disordered breathing (SDB) was diagnosed in 70.4 % of patients according to ICSD-3-TR criteria. In univariate logistic regression, poor asthma control (Asthma Control Test < 20) was associated with SDB (OR 2.71, 95% CI 1.28–5.70), breathing pauses (OR 3.84, 95% CI 1.69–8.74), night awakenings (OR 2.85, 95% CI 1.40–5.79), restless sleep (OR 4.11, 95% CI 1.91–8.82), and unrefreshed sleep (OR 3.34, 95% CI 1.55–7.17). In multivariate logistic regression adjusting for these sleep disturbances as well as age, obesity, gastroesophageal reflux disease, smoking status, allergic rhinitis, and cardiovascular disorders, both SDB (OR 3.17, 95% CI 1.27–7.90) and unrefreshed sleep (OR 2.51, 95% CI 1.02–6.19) remained independently associated with poor asthma control.

Conclusion: Sleep disturbances were highly prevalent in patients with difficult-to-treat asthma, with more than 70% diagnosed with sleep-disordered breathing. While multiple nocturnal symptoms were associated with poor asthma control in univariate analysis, only sleep-disordered breathing and unrefreshed sleep emerged as independent predictors.

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0559

THE XXY CONNECTION: EXPLORING THE PREVALENCE OF SLEEP DISORDERS IN KLINEFELTER SYNDROME

Nayla Ahmed, Julie Baughn, Christine Matarese,

Timothy Morgenthaler

Mayo Clinic, Rochester

Introduction: Klinefelter syndrome (KS) is a chromosomal condition marked by hypogonadism and disturbances in hormonal regulation. The relationship between KS and co-occurring sleep disorders has not been extensively characterized, creating a need for more detailed investigation.

Methods: We identified individuals with Klinefelter syndrome (KS) evaluated at our institution between January 2000 and December 2025 using ICD-9 and ICD-10-CM codes. Electronic health records were then manually reviewed to confirm KS status and to exclude miscoded entries. For confirmed cases, we extracted data on sleep-related complaints, diagnoses, diagnostic

testing (overnight oximetry, polysomnography, home sleep testing), and treatment. Sleep disorders were categorized operationally: obstructive sleep apnea (OSA), central sleep apnea (CSA), insomnia, hypersomnia/narcolepsy, or other according to documented clinician diagnosis or diagnostic test results. When structured Sleep Center data were available, these were included. We summarized cohort characteristics using means ($\pm$ SD) or medians (interquartile range) as appropriate. For comparison between subgroups (e.g., those with vs without documented sleep-disordered breathing), we applied Welch's t-test and binomial proportion tests. Analyses were conducted using Python scripts and spreadsheet software.

Results: Nearly one-third of patients with confirmed KS in this series had either diagnosed or suspected obstructive sleep apnea (OSA), substantially exceeding prevalence estimates in the general population. The frequency of central sleep apnea (CSA) was comparable to that seen in the general population, however its occurrence without usual predisposing factors suggests a predisposition toward idiopathic CSA in KS. Circadian rhythm disorders were rare, occurring in < 1% of the cohort. Notably, nearly 75% of KS patients with documented sleep-related symptoms had never undergone formal evaluation in a Sleep Center.

Conclusion: The observed rate of presumed idiopathic CSA among individuals with KS suggests the possibility of KS-specific mechanisms affecting ventilatory control stability. Additionally, there appeared to be a larger prevalence of OSA in this patient population. Notably, approximately three-quarters of KS patients who reported sleep-related symptoms had never undergone a formal Sleep Medicine assessment, highlighting a significant gap in structured evaluation that may relate to limited access to specialized care, referral patterns, or other systemic barriers, and warrants additional study.

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0560

ASSOCIATIONS OF LATE MIDLIFE SLEEP-DISORDERED BREATHING WITH LATE-LIFE BRAIN AMYLOID DEPOSITION

Kening Jiang¹, Mark Wu², Pamela Lutsey³, Clifford Jack⁴, Kristine Yaffe⁵, Vadim Zipunnikov⁶, Dean Wong⁷, Ganesh Chand⁸, Omonigho Bubu⁹, Susan Redline¹⁰, Brendan Lucey¹¹, A. Richey Sharrett¹², Rebecca Gottesman¹³, Adam Spira¹

¹Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, ²Department of Neurology, Johns Hopkins School of Medicine, ³Division of Epidemiology and Community Health, University of Minnesota, ⁴Department of Radiology, Mayo Clinic, ⁵Departments of Psychiatry and Behavioral Sciences, Neurology, and Epidemiology, University of California, San Francisco, ⁶Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, ⁷Department of Neurosurgery, Kahlert Institute of Addiction Medicine, University of Maryland Baltimore School of Medicine, ⁸Department of Radiology, School of Medicine, Washington University in St. Louis, ⁹NYU Grossman School of Medicine, ¹⁰Brigham and Women's Hospital, ¹¹Department of Neurology, School of Medicine, Washington University in St. Louis, ¹²Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, ¹³Stroke Branch, National Institute of Neurological Disorders and Stroke Intramural Research Program, National Institutes of Health

Introduction: Sleep-disordered breathing (SDB) is a potentially modifiable risk factor for the prevention of dementia, of which

Alzheimer's disease (AD) is the most common cause. However, there is a lack of longitudinal evidence relating SDB to AD pathology >20 years later. We examined the association between late-midlife SDB and late-life brain β -amyloid ($A\beta$) deposition—a hallmark of AD—assessed approximately 23 years later.

Methods: The Atherosclerosis Risk in Communities (ARIC) Study is an ongoing prospective cohort study initiated in 1987. Participants at two ARIC sites (Washington County, Maryland; Minneapolis, Minnesota) with primarily White participants also completed polysomnography (PSG) in the Sleep Heart Health Study (SHHS) in 1995-98. SDB measures included apnea-hypopnea index (AHI; number of apneas + hypopneas with $\geq 3\%$ oxygen desaturation/hour of sleep), arousal index, and percentage of total sleep time in apnea, in hypopnea, and with oxygen saturation < 90%. A subset of participants completed florbetapir positron emission tomography (PET) scans through several ARIC ancillary studies (2011-2025 including the ARIC Sleep-PET study). We defined $A\beta$ deposition as a global standardized uptake value ratio (SUVR) >1.2 (vs. SUVR ≤ 1.2). We used Poisson regression with robust standard errors to estimate relative risk (RR) of $A\beta$ deposition by SDB, adjusting for demographics and vascular risk factors, and applied inverse probability attrition weighting to account for selective drop-out.

Results: Among 186 dementia-free participants (mean age=59 years at PSG and 82 years at PET scan, 58% female, 98% White), every 10% increase in total sleep time in hypopnea was associated with higher risk of $A\beta$ deposition (RR=1.40, 95% confidence interval [CI]: 1.03, 1.91). When compared to no SDB (AHI < 5), moderate to severe SDB (AHI ≥ 15) was associated with elevated $A\beta$ deposition (RR=2.36, 95% CI: 1.22, 4.57); mild SDB (AHI 5 to < 15) was not (RR=1.05, 95% CI: 0.53, 2.07).

Conclusion: SDB in late midlife was associated with greater risk of $A\beta$ deposition approximately 23 years later. SDB may play a role in the early stages of AD pathogenesis. Future longitudinal studies are needed to optimize strategies for screening and treating SDB for dementia prevention.

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0561

COMPARISON OF APNEIC EVENTS BETWEEN NATURAL SLEEP AND DRUG-INDUCED SLEEP ENDOSCOPY WITHOUT TARGET CONTROLLED INFUSION

Muskaan Aggarwal¹, Michael Nichols¹, Thomas Joseph¹, Everett Seay², Raj Dedhia²

¹University of Pennsylvania, ²University of Pennsylvania, Perelman School of Medicine

Introduction: Drug-induced sleep endoscopy (DISE) represents the gold standard airway evaluation for sleep surgeons, with the FDA requiring DISE prior to hypoglossal nerve stimulation therapy in the United States. However, its ability to recapitulate sleep breathing pathology is unproven, especially in the United States where target-controlled infusion (TCI) is not available.

Methods: Consecutive patients who underwent both an in-lab polysomnography (PSG) and DISE with a propofol infusion via the Noxturnal US v7.1.1 platform (NoxMedical) were included. Two reviewers analyzed a baseline period of DISE and the first 10 minutes of consecutive non-REM supine sleep beginning with N2. DISE and PSG were analyzed for types of events (obstructive,

central, and mixed), duration of baseline, and mean oxygen saturation. Hypopneas were defined as periods at least ten seconds long with a thirty-percent reduction in flow and a three-percent desaturation; apneas were defined as periods at least ten seconds long with a ninety-percent reduction in flow. For each comparison and proportion of each event type (number of events of event type/total number of events), paired t-tests were performed.

Results: Patients (n=20) were generally older (54.9 +/- 15.4 years), male (75%), and overweight at the time of their DISE (27.5 +/- 4.3 kg/m²) and their PSG (27.7 +/- 4.4 kg/m²). An average of 3.1 minutes and 10.1 minutes were analyzed during DISE and PSG, respectively. DISE had a significantly higher AHI than PSG (72.9 vs 48.0 events/hour, p=0.003) and significantly lower mean oxygen saturation (85.8% vs 92.8%, p< 0.001). However, proportions of each event type were comparable between DISE and PSG – obstructive apneas (0.25 vs 0.30, p=0.51), obstructive hypopneas (0.67 vs 0.58, p=0.26), central apneas (0.02 vs 0.01, p=0.80), central hypopneas (0.01 vs 0.02, p=0.85), and mixed apneas (0.05 vs 0.04, p=0.62).

Conclusion: Our study findings confirm that propofol, compared to natural sleep, worsens upper airway obstruction, as determined by AHI and mean oxygen saturation. However, surprisingly, proportion of each event type was maintained between settings. These data support the use of DISE, even without TCI, to visualize upper airway obstruction as part of the treatment selection algorithm.

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0562

ASSESSING HEALTHCARE PROVIDER KNOWLEDGE OF SLEEP APNEA: A SYSTEMATIC REVIEW AND META-ANALYSIS OF STUDIES USING THE OSAKA QUESTIONNAIRE

Aleah St. Martin¹, Chidera Ejikeme², Rashon Lane³, Brett Avery⁴, Rebecca Robbins⁵, Sophia Schneider⁶

¹Brigham and Women's Hospital, ²Brigham and Women's Hospital Division of Sleep and Circadian Disorders, ³Sutter Health, Center for Health Systems Research, ⁴Sutter Health, ⁵Division of Sleep Medicine, Harvard Medical School, ⁶Harvard Medical School

Introduction: Obstructive sleep apnea (OSA) remains an under-recognized condition. General healthcare providers (e.g., primary care providers) can play an important role in identifying patients with OSA, yet their knowledge about the condition can vary. We conducted a systematic review and meta-analysis of studies administering the Obstructive Sleep Apnea Knowledge and Attitude (OSAKA) questionnaire to non-sleep specialists.

Methods: A comprehensive search was performed across six databases: MEDLINE, Embase, CINAHL, Web of Science, Global Health, and WHO Global Index Medicus. This search identified studies that administered the OSAKA questionnaire to general healthcare providers. Data extraction and risk of bias were assessed independently by 2 reviewers. A meta-analysis of eligible studies was then performed using meta-aggregative qualitative synthesis to synthesize and report mean knowledge and attitude scores. Studies were excluded from the synthesis if they lacked a reported standard deviation for attitude scores.

Results: In total, 13 studies involving were including 2,427 healthcare providers were included. The most common specialty in the

sample was anesthesiology (n=1,041, 42.9%), followed by primary care providers (n=543, 22.4%) and medical and dental students (n=393, 16.2%). Meta-analysis revealed the overall effect size for knowledge scores was 6.48 (95% CI: 4.47-8.50) and 9.78 (95% CI: 641-13.16).

Conclusion: OSA remains widely underdiagnosed and under-treated. Many general healthcare providers could play an important role in screening and promoting awareness about this disorder, yet our analysis revealed low overall knowledge scores (6.4 out of 18 possible points) and attitude/confidence scores (9.78 out of 25 possible points). These findings highlight the need for initiatives to strengthen provider awareness.

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0563

MACHINE LEARNING-BASED PREDICTION OF SLEEP APNEA USING OBJECTIVE SLEEP DATA FROM 138 CONSUMER SLEEP TECHNOLOGIES

Alice Lynch¹, Luke Gahan¹, Nathaniel Watson², Elie Gottlieb¹

¹Sleep.ai, ²University of Washington School of Medicine, Department of Neurology

Introduction: Obstructive sleep apnea (OSA) remains highly prevalent yet markedly underdiagnosed. Consumer sleep technologies (CSTs) offer scalable access to objective sleep data, but device-specific differences in sensing and proprietary algorithms limit their clinical utility. Most prior work uses single-device datasets. We developed a cross-device harmonization framework to align heterogeneous CST-derived sleep metrics and evaluated its capacity to support scalable, device-agnostic OSA screening.

Methods: Objective sleep data from users of the SleepScore mobile app were contributed through Apple HealthKit from 138 third-party devices and apps, including most wearables (e.g. Apple Watch, Garmin, Oura, Whoop) and mobile sleep apps. OSA status was established via self-report of clinical diagnosis (13% of users self-reported OSA). The dataset contained 19,431 users (4.3M nights). Users reporting active treatment or comorbidities were excluded. Heterogeneous device-derived sleep metrics were aligned onto a common scale using a cross-device harmonization model, correcting systematic differences across device ecosystems, and producing device-agnostic metrics while preserving physiologically relevant variance. For each user-device combination, 376 engineered features captured nightly distributions, weekday-weekend contrasts, and temporal trends. Automated Machine Learning (PyCaret) compared classifiers using 10-fold cross-validation with 80/20 train/test user-level split to prevent target leakage. The models were optimized for Kappa and were evaluated using AUROC and standard classification metrics.

Results: A Linear Discriminant Analysis (LDA) model performed best (AUC 0.77, accuracy 74%, sensitivity 63%, specificity 77%, precision 38%, F1-score 0.48, Kappa 0.32). Performance was relatively consistent across the 12 most common devices despite large differences in self-reported prevalence (12–29%), with balanced accuracy ranging from 62%–74%, and Kappa from 0.23–0.34. Key non-demographic predictors reflect variability in sleep patterns, suggesting that fluctuations in sleep stability may play a role in identifying OSA risk.

Conclusion: These results support the potential of consumer sleep technologies, when combined with cross-device standardization, to improve early OSA identification independent of

device type. The findings highlight promising device-agnostic performance while also indicating opportunities for refinement, including prospective PSG validation and improved labeling strategies.

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0564

MAKING TYPE III HSAT RECORDINGS CONCLUSIVE: LARGE-SCALE VALIDATION OF AN FDA-CLEARED AI AHI CLASSIFIER FROM HSAT SIGNALS

Jón Ágústsson¹, Rósa Hugosdóttir¹, Eysteinn Finnsson¹, Þóra Sigmarsdóttir¹, Megan McPhee¹, Sigurður Ægir Jonsson¹, Eydis Arnardóttir¹, Ernir Erlingsson¹, Guðný Árnadóttir¹, Kristófer Montazeri¹, Daníel Wilcox¹, Heidi Riney²
¹Nox Research, Nox Medical ehf, ²Nox Health

Introduction: Type III home sleep apnea tests (HSAT) lack electroencephalography for sleep and arousal scoring. Currently, a respiratory event index based on monitoring time, rather than an apnea-hypopnea index (AHI), is commonly reported from HSATs. This underestimates disease severity and leaves HSAT studies inconclusive, necessitating in-lab polysomnography. We evaluated whether DeepRESP v2.0 (K252330), an FDA 510(k)-cleared medical device, yields conclusive AHI-based severity classification aligned with attended polysomnography from HSAT signals commonly acquired in patients' homes.

Methods: We conducted a retrospective, multicenter validation using 5,771 Type I/II polysomnograms from accredited US sleep programs, manually scored by registered technologists and board-certified sleep physicians. To our knowledge, this dataset is substantially larger than the cohorts typically used in FDA 510(k) validation studies of HSAT devices. HSAT channels (nasal pressure, thoracoabdominal inductance belts, oximetry, body position) were fed to the device to score wake/NREM/REM, arousals, and respiratory events, and to compute AHI. Reference AHI came from full-montage manual scoring. Positive percentage (PPA), negative percentage (NPA), and overall percentage agreement (OPA) with manual AHI categories (≥ 5 , ≥ 15 , ≥ 30 events/hour) were estimated with 95% confidence intervals. Subgroups summarized heterogeneity in age, sex, BMI, severity, and race/ethnicity.

Results: The cohort was heterogeneous: adults aged 18 to >65 years; 35% were female; 58% had BMI ≥ 30 kg/m²; AHI ranged from normal to severe; and recordings included PSGs from both in-laboratory and home settings. For AHI classification, agreement with manual scoring was high across thresholds: for AHI ≥ 5 , PPA 91.0%, NPA 78.0%, OPA 90.6%; for AHI ≥ 15 , PPA 78.1%, NPA 93.9%, OPA 81.7%; and for AHI ≥ 30 , PPA 69.9%, NPA 97.5%, OPA 85.0%. High agreement was observed across demographic subgroups (age, sex, BMI, and race/ethnicity), supporting consistent performance across a diverse adult population.

Conclusion: AHI derived from the device closely aligns with conventional AHI from attended polysomnography, supporting conclusive severity classification from HSAT and potentially reducing inconclusive HSAT studies and repeat in-lab testing, thereby

streamlining the diagnostic pathway and earlier linkage to therapy.

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0565

UNSUPERVISED CLUSTER ANALYSIS IN SLEEP APNEA RESEARCH: AN EMPIRICAL EVALUATION OF METHODOLOGICAL DECISIONS

Ying Zhang¹, Carmen Isasi², Susan Redline¹, Tamar Sofer³

¹Brigham and Women's Hospital, ²Albert Einstein College of Medicine, ³Beth Israel Deaconess Medical Center

Introduction: Cluster analysis is increasingly used in obstructive sleep apnea (OSA) research to identify clinically and biologically meaningful subtypes. A major gap in current OSA clustering research is the limited evaluation of how methodological choices affect the results. Here we used a large population-based cohort to perform an empirical evaluation of methodological decisions.

Methods: Utilizing data from the Hispanic Community Health Study/Study of Latinos, we applied clustering to 23 features from four domains: sleep timing/duration, sleep disturbance/sleepiness, heart rate during sleep, and sleep-disordered breathing, along with age, sex, and BMI. Analyses were performed in the full sample (n=14,512), moderate-to-severe OSA (respiratory event index, REI ≥ 5 ; n=4,403) and severe OSA (REI ≥ 15 ; n=1,623). We permuted combinations of supervised variable selection (LASSO and univariate regression predicting REI) and unsupervised dimension reduction methods (PCA and two-stage post-clustering selection), and of clustering algorithms (K-means, hierarchical clustering, latent profile analysis). We also performed "null model" comparisons, applying the entire clustering pipeline over datasets with all features permuted to nullify any correlations between them. Results from the null model were used to normalize the performance measures of observed data clustering. Performance measures included Davies-Bouldin Index (DBI), Calinski-Harabasz Index (CHI), Silhouette Score, and normalized Shannon's entropy. These were aggregated to a composite rank score (CRS). Held-out samples were used for external evaluation via cluster-structure projection and decision-tree classifier. Additional assessments included robustness to imputation (adjusted RAND index) and visualization via t-SNE.

Results: K-means cluster showed the highest stability across imputed data (ARI: mean=0.81, SD=0.14) and consistently achieved the best performance when paired with PCA (CRS: mean=0.88, SD=0.03). Hierarchical clustering frequently failed to project cluster assignments in held-out data (13 out of 38 projections) and to distinguish real structure from noise (all metrics within null-model range in 19 out of 41 comparisons). Clustering implemented with PCA or univariate regression consistently identified two to three clusters and had moderate to high performance metrics.

Conclusion: Applying clustering algorithms over "null data" and assessment over a held-out dataset are useful for validating clustering results. While hierarchical clustering may be useful for exploratory analysis, K-means appears to offer a more robust default choice for routine analysis.

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0566

BASELINE CHARACTERISTICS OF CENTRAL SLEEP APNEA PATIENTS TREATED WITH TRANSVENOUS PHRENIC NERVE STIMULATION IN THE REST STUDY

Lee Goldberg¹, Jorge Mora¹, Jerryll Asin², Henrik Fox³, Mark Neagle⁴, Michael Drucker⁵, Scott McKane⁶, Ralph Augostini⁷, Timothy Morgenthaler⁸

¹University of Pennsylvania, ²Amphia Hospital, ³Herz- und Diabeteszentrum Nordrhein-Westfalen, ⁴UC Health Medical Center of the Rockies, ⁵Novant Health Forsyth Medical Center, ⁶ZOLL, ⁷The Ohio State University, ⁸Mayo Clinic, Rochester

Introduction: The remedē System® Therapy Study (reST) is a real world evaluation using transvenous phrenic nerve stimulation (TPNS) to treat adults with moderate-to-severe central sleep apnea (CSA). Based on previous clinical trials, it was expected that most patients with CSA would have heart failure (HF). However, recent CSA prevalence publications demonstrated the opposite. We present the baseline characteristics of patients with CSA treated with TPNS.

Methods: Adult subjects determined eligible for a commercial TPNS device implant by routine clinical PSGs were consented to participate in the trial. Baseline assessments were performed and medical history collected. Patients will be followed for ≥1 year following therapy activation; follow-up is ongoing. This report describes the baseline characteristics of the patient population.

Results: Twenty-nine sites enrolled a total of 197 subjects (171 United States & 26 the Netherlands) between July 2019 and March 2025. Median [Q1-Q3] age was 70 [61-76] years, 82% were male, and 97% white race. Body mass index was 28.7 [25.8-31.6] kg/m², with neck size 41 [28-44] cm. Patients had moderate-to-severe CSA with site-reported apnea-hypopnea index of 46/hour [30-64], including central apnea index of 24/hour [13-38]. Despite a range of comorbidities among patients, HF was documented in just 23%. Other cardiovascular conditions were more prevalent, including hypertension (70%), hyperlipidemia (65%), coronary artery disease (37%), atrial fibrillation (34%), and prior stroke (14%). Non-cardiac issues such as depression (27%), diabetes (26%), and renal disease (18%) were also present. Additionally, 22% of patients used narcotics, and 89% had previously failed another CSA therapy, most often CPAP (79%), Bi-PAP (39%), or ASV (32%). Lastly, almost 20% were from high altitude locations (>5,000 feet).

Conclusion: Patients implanted with TPNS had significant comorbidities. However, HF was much less common than anticipated. This finding could be due to CSA being present in clinical practice with a wider range of underlying causes beyond HF, or undiagnosed early-stage HF. Alternatively, it may reflect referral bias for this specific therapy, with patients selected because of prior treatment failures or other comorbidities. These possibilities highlight the importance of recognizing CSA in a diverse patient

population and underscore the need for multidisciplinary team management.

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0567

ENHANCING CENTRAL SLEEP APNEA DETECTION VIA AI-DRIVEN AUTOSCORING BY A WEARABLE HOME SLEEP APNEA TEST

Chelsie Rohrscheib¹, Antonio Artur Moura¹, Motti Perlman¹, Amir Reuveny¹, Ruchir Patel², Atul Malhotra³

¹Wesper, Inc., ²The Insomnia and Sleep Institute of Arizona, ³UC San Diego Health

Introduction: Artificial intelligence (AI) is reshaping medical diagnostics by improving accuracy, consistency, and scalability across diverse clinical domains. The Wesper Lab Home Sleep Apnea Test (HSAT) Autoscoring Algorithm (AA) applies AI-based analysis to direct measurements of respiratory effort, airflow, and SpO₂. This study validated the accuracy of the AA for scoring central apnea events compared with manual human scoring (MHS).

Methods: We performed a multi-tiered validation using two datasets to assess the accuracy of the AA for determining the central apnea index (CAI). The primary analysis compared CAI from simultaneous HSAT and polysomnography (PSG) studies in 45 patients (27 males, 18 females; mean age 48.8 ± 14.7 yr) scored by blinded technologists. The secondary analysis evaluated the AA against 45 HSAT recordings scored by a blinded scorer. The tertiary analysis examined 129 HSAT sessions from 104 patients (81 males, 46 females, 2 undetermined; mean age 49.9 ± 13.8 yr; BMI 33.9 ± 7.6) manually rescored across 11 U.S. clinics. Agreement between AA and manual scoring for CAI was assessed using Pearson correlation and Bland-Altman limits of agreement (LOA).

Results: In the primary analysis comparing the AA to PSG studies, the AA demonstrated strong agreement for CAI ($r = 0.95$, 95% LOA = -2.8 to 2.9 events/h; $p < 0.001$). In the secondary analysis of 45 HSAT studies manually scored by blinded technologists, the AA maintained excellent concordance ($r = 0.93$, 95% LOA = -1.49 to 1.90; $p = 0.0038$). In the tertiary analysis of 129 real-world HSATs manually rescored, the AA achieved $r = 0.98$ with Bland-Altman 95% LOA of -3.53 to 3.45 for CAI, exceeding the predefined performance goal ($p < 0.0001$).

Conclusion: The AA demonstrated excellent accuracy for detecting central sleep apnea across all validation tiers. By integrating AI with direct respiratory effort and airflow signals, the system overcomes key limitations of traditional HSATs that rely on indirect or surrogate markers. Implementation of AI-based autoscoring may enhance diagnostic precision, reduce human scoring variability, and expand the scalability of home-based sleep testing for central sleep apnea.

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0568

FULLY AUTOMATED CENTRAL APNEA SCORING IN HOME SLEEP APNEA TESTING USING DUAL VOLUMETRIC RIP AND AI ANALYSIS

Jón Ágústsson¹, Rósa Hugosdóttir¹, Eysteinn Finnsson¹, Þóra Sigmarsdóttir¹, Megan McPhee¹, Sigurður Ægir Jonsson¹, Eydís Arnardóttir¹, Ernir Erlingsson¹, Guðný Árnadóttir¹, Kristófer Montazeri¹, Daníel Wilcox¹, Scott Sands², Heidi Riney³

¹Nox Research, Nox Medical ehf, ²Harvard University, ³Nox Health

Introduction: HSAT is recommended for adults with suspected obstructive sleep apnea (OSA). AASM HSAT rules recommend classifying apneas as obstructive or central when respiratory effort signals are available, although reporting the central apnea-hypopnea index (CAHI) is optional. Central scoring is challenging because signals are often degraded and many automated HSAT systems require manual review and rescore of central events. We evaluated DeepRESP v2.0 (K252330), an FDA-cleared AI software-as-a-medical-device (SaMD) that provides automated central apnea scoring from HSAT data without a central-event-specific rescore requirement beyond standard clinical review.

Methods: We retrospectively validated the system in adults using multi-center PSG studies reformatted as HSAT channels: nasal pressure airflow, dual thoracoabdominal volumetric RIP, SpO₂, and body position. Respiratory events, including central apneas, were manually scored per AASM rules by technologists and physicians. The device automatically detects apneas from nasal cannula or RIP, classifies them as obstructive or central from thoracic and abdominal effort, and computes HSAT indices. The dual-belt volumetric RIP system is designed for robust attachment and an approximately linear relation to flow, improving reliability and sensitivity versus single-belt or non-calibrated RIP. We summarized performance using positive, negative, and overall percent agreement (PPA, NPA, OPA) for CAHI ≥ 5 events/h versus the reference.

Results: 5771 sleep recordings were included. CAHI ≥ 5 classification showed PPA 80.7%, NPA 98.0%, and OPA 97.2% relative to the manually scored reference standard. Overall apnea metrics remained robust, with OPA for all apneas (obstructive and central) $\geq 97\%$ and high specificity for central events, indicating that automated scoring did not inflate central counts. Central classification remained reliable when airflow degraded or cannula failed, relying on dual-belt RIP.

Conclusion: An FDA-cleared AI SaMD delivered fully automated central apnea scoring from HSAT signals with high agreement to expert scoring, without any central-apnea-specific rescore beyond standard clinical review. Dual thoracic and abdominal volumetric RIP supports AASM rules for distinguishing central from obstructive events and provides reliable quantification of incidental central events on HSAT to guide evaluation and treatment.

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0569

IMPACT OF OXYGEN DESATURATION CRITERIA ON MEDICARE-ELIGIBLE HYPOGLOSSAL NERVE STIMULATION ELIGIBILITY: 3% VERSUS 4% DESATURATION ANALYSIS

Vikas Jain, Stefen Yang, Grant Bond, Kyla Marquez, Rebecca Abraham

Dream Center for Sleep & Circadian Sciences

Introduction: Hypoglossal nerve stimulation (HGNS) requires an apnea-hypopnea index (AHI) ≥ 15 with $< 25\%$ central events. Many payers, including Medicare, still mandate the outdated 4% oxygen-desaturation criterion, despite evidence that the 3% rule is more physiologic and better aligns with cardiovascular outcomes. Multi-night home sleep apnea testing (HSAT) improves diagnostic reliability, but the impact of scoring rule choice on HGNS eligibility in Medicare-eligible adults (age ≥ 65) has not been quantified.

Methods: Using a large multi-night HSAT dataset, we applied standardized inclusion criteria consistent with multi-night validation literature: • recording time ≥ 4 hours; • ≥ 1 hour of inferred sleep; • ≥ 2 valid nights included; • up to 7 consecutive nights analyzed. For each patient, nightly AHI was calculated using both 3% and 4% hypopnea rules. Medicare-eligible patients were defined as age ≥ 65 . HGNS eligibility required AHI 15–65 on at least one night. “Rescued” patients were those eligible under the 3% rule but ineligible under the 4% rule.

Results: A total of 4,255 multi-night HSAT patients met inclusion criteria, of whom 738 (17.3%) were Medicare-eligible. Among these older adults: • HGNS-eligible using the 3% rule: patients with any-night AHI_{3%} ≥ 15 • HGNS-eligible using the 4% rule: patients with any-night AHI_{4%} ≥ 15 • Rescued by the 3% rule: 169 of 738 (22.9%) who qualified under 3% but were excluded under 4%. Most rescued patients had worst-night AHIs between 15–20, a zone where small scoring shifts translate into major eligibility differences.

Conclusion: In this large multi-night HSAT cohort, nearly one in four Medicare-eligible adults who legitimately meet the HGNS AHI threshold under the physiologic 3% rule are excluded when the 4% rule is applied. This diagnostic misalignment disproportionately affects older adults, the population with the highest cardiometabolic risk and the greatest potential benefit from HGNS. These findings support updating payer scoring policies to adopt the 3% rule and reduce inequitable barriers to therapy access.

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0570

MACHINE LEARNING-BASED DETECTION OF SLEEP APNEA USING PHOTOPLETHYSMOGRAPHY SIGNALS

Kangyong Eo¹, Jeongwook Kwon¹, Hyounghyu Kim²

¹Slowave Inc., ²Sungkyunkwan University / Slowave Inc.

Introduction: Sleep apnea imposes significant cardiovascular and neurocognitive burdens through recurrent nocturnal respiratory disruptions. Timely and accurate detection remains imperative to mitigate downstream complications. While polysomnography remains the diagnostic gold standard, its high cost, technical complexity, and limited accessibility pose substantial barriers to widespread screening and monitoring. In this study, we developed and validated a machine learning-based approach to detect sleep apnea using photoplethysmography signals alone, potentially enabling scalable and non-invasive monitoring.

Methods: Photoplethysmography signals were acquired from 50 individuals at a clinical sleep center, including 25 participants with diagnosed sleep apnea and 25 individuals undergoing positive airway pressure therapy. Signals were recorded via finger probes at a sampling frequency of 100 Hz. From each subject, 120-second epochs were extracted, yielding 50 engineered

features per epoch. All features were standardized using Z-score normalization, and extreme values exceeding ± 3 standard deviations were excluded. Feature selection based on importance metrics resulted in 18 dominant features. A linear support vector machine model was developed and evaluated in two phases. First, leave-one-subject-out cross-validation was performed within the sleep apnea group to assess baseline classification accuracy. Second, the trained model was tested on the independent positive airway pressure group to evaluate generalizability. Subject-level classification was determined by averaging epoch-wise probabilities, with a threshold of 0.455 applied to delineate sleep apnea.

Results: The support vector machine model achieved a subject-level classification accuracy of 88.0% in both the sleep apnea and positive airway pressure groups. Prediction probabilities were consistently above the classification threshold in the sleep apnea group and predominantly below threshold in the positive airway pressure group, indicating robust separation and stable model performance across cohorts.

Conclusion: This study demonstrates the feasibility of detecting sleep apnea with high fidelity using photoplethysmography signals and a machine learning framework. These findings provide a technical foundation for future wearable-based and home-based sleep monitoring systems. Further validation in larger and more diverse populations, as well as in real-world clinical and home environments incorporating multimodal physiological data, will be essential for clinical translation.

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0571

SINGLE-NIGHT TESTING MISS RATE FOR HYPOGLOSSAL NERVE STIMULATION CANDIDATES UNDER AGE 65: A MULTI-NIGHT ANALYSIS

Vikas Jain, Stefen Yang, Grant Bond, Kayden Amador, Sanjana Poonuru

Dream Center for Sleep & Circadian Sciences

Introduction: Hypoglossal nerve stimulation (HGNS) qualification requires a diagnosis of moderate to severe obstructive sleep apnea (OSA), defined by an apnea-hypopnea index (AHI) of 15–100 events per hour. In non-Medicare populations (age < 65), candidacy is assessed using single-night home sleep apnea testing (HSAT). However, night-to-night variability can misclassify patients with false negatives whose AHI does not meet the diagnostic threshold on the single night of testing despite meeting HGNS criteria on average. False-negative rates of single-night testing among potential HGNS candidates in this age group were evaluated.

Methods: We identified 3,469 patients younger than 65 years who completed multi-night HSAT scores using 3% oxygen desaturation criterion. Patients were classified as HGNS candidates if they met the qualifying AHI range of 15–100 on any study night. To estimate the false-negative rate associated with single-night HSAT, we determined the proportion of HGNS-eligible patients whose first night of testing reported an AHI outside the qualifying range. This represents candidates who would have been incorrectly deemed ineligible for HGNS had only a single-night study been performed.

Results: Of the total 3,469 patients under age 65, 2,174 (62.70%) were found to be HGNS candidates, reporting an AHI from 15–100 on at least one night of testing. Among these candidates, 1,809 (83.21%) achieved a qualifying AHI range on the first night. The remaining 365 candidates (16.79%) did not qualify on their initial study despite meeting the criteria on subsequent nights. These cases represent false negatives that would have been misclassified as ineligible for HGNS under standard single-night testing. On average, these false-negative patients required 3.1 nights of testing before demonstrating an AHI within therapeutic range.

Conclusion: Single-night HSAT failed to identify 16.79% patients under 65 who ultimately met AHI criteria for HGNS. These findings demonstrate that single-night studies can exclude substantial numbers of individuals who would benefit from HGNS. Multi-night testing may improve the identification of HGNS candidates, ensuring patients with moderate-to-severe OSA who are unable to tolerate CPAP are accurately recognized for therapy. These findings underscore the necessity to re-evaluate single-night HSAT as the standard approach for determining HGNS candidacy.

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0572

CONCLUSIVE AHI FROM RIP-ONLY TYPE III HSAT: COMPARISON OF RIP-BASED AND CANNULA-BASED AI ANALYSES IN A LARGE MULTICENTER COHORT

Jón Ágústsson¹, Rósa Hugosdóttir¹, Eysteinn Finnsson¹, Þóra Sigmarsdóttir¹, Megan McPhee¹, Sigurður Ægir Jonsson¹, Eydis Arnardóttir¹, Ernir Erlingsson¹, Guðný Árnadóttir¹, Kristófer Montazeri¹, Daníel Wilcox¹, Scott Sands², Heidi Riney³

¹Nox Research, Nox Medical ehf, ²Harvard University, ³Nox Health

Introduction: Type III home sleep apnea tests (HSAT) rely on respiratory flow measurement to score apneas and hypopneas. Although respiratory inductance plethysmography (RIP) has traditionally been viewed as an effort signal, contemporary implementations can capture respiratory morphology with sufficient fidelity to support RIP as a primary measurement of breathing. We evaluated whether a RIP-only Type III HSAT configuration (without nasal cannula) can deliver conclusive AHI-based severity classification comparable to full-montage attended polysomnography (PSG).

Methods: We performed a retrospective multicenter study using 5,771 Type I/II PSGs manually scored by registered technologists and board-certified sleep physicians. Two HSAT signal configurations were simulated from the same recordings: (1) a nasal-cannula HSAT configuration (nasal pressure, thoracoabdominal RIP, oximetry) and (2) a RIP-only HSAT configuration (thoracoabdominal RIP, oximetry). Both were processed by DeepRESP v2.0 (K252330), an FDA-cleared medical device, to score sleep/wake, respiratory events, and derive the AHI. PSG-scored AHI served as the reference. Positive-, negative-, and overall percentage agreement (PPA, NPA, OPA) with AHI thresholds (≥ 5 , ≥ 15 , ≥ 30 events/hour) were computed with 95% confidence intervals. Subgroup summaries characterized heterogeneity across age, sex, body mass index, race/ethnicity, and AHI.

Results: The cohort was clinically diverse: adults 18–88 years old, 35% female, 58% with body mass index ≥ 30 kg/m², with AHI values spanning normal to severe. For AHI ≥ 5 , RIP-only HSAT achieved PPA 93.7%, NPA 63.5%, OPA 92.8%, compared with

nasal-cannula HSAT PPA 91.0%, NPA 78.0%, OPA 90.6%. For AHI ≥ 15 , RIP-only HSAT achieved PPA 81.0%, NPA 91.1%, OPA 83.4%, versus nasal-cannula PPA 78.1%, NPA 93.9%, OPA 81.7%. Agreement at AHI ≥ 30 remained similarly high for both configurations. Across thresholds, RIP-only performance was within a few percentage points of the nasal-cannula configuration.

Conclusion: RIP-only Type III HSAT analyzed by AI can yield conclusive AHI-based severity classification that closely tracks attended PSG and performs comparably to a nasal-cannula-based HSAT configuration. These findings demonstrate that high-quality RIP signals—without a nasal cannula—can provide robust breathing information for AHI estimation, reducing inconclusive HSAT studies and decreasing the likelihood of repeat testing.

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0573

FALSE NEGATIVE HOME SLEEP APNEA TESTS IN WOMEN VS. MEN

Lara Asroui¹, Ramis Nazir², Dennis Auckley³

¹The MetroHealth System/Case Western Reserve University,

²MetroHealth - Case Western Reserve University, ³Case Western Reserve University

Introduction: Home sleep apnea testing (HSAT) is routinely used to diagnose obstructive sleep apnea (OSA). Traditional flow-based HSATs measure specific cardiac and pulmonary parameters but do not determine wake vs sleep due to lack of EEG monitoring. The American Academy of Sleep Medicine's (AASM) recommended scoring for respiratory events includes events associated with a 3% drop in oxygen saturation or an arousal from sleep. Respiratory events associated only with arousals will be missed on flow-based HSATs. Based on their apnea-hypopnea index (AHI), women typically have less desaturation-based and more arousal-based OSA, despite similar symptom burden, when compared to men. Oxygen desaturation-based scoring criteria may lead to underdiagnosis of OSA in women compared to men with flow-based HSAT testing.

Methods: This was an IRB approved retrospective chart review study. Patients who underwent a flow-based HSAT in 2023-24 at our institution were included. HSATs that were technical failures were excluded. A total of 820 patients qualified. Of those with a negative HSAT (respiratory event index (REI) 4% < 5), basic demographic data, medical comorbidities, patient-reported sleep symptoms, ESS and REI4% were collected. Of those who had a polysomnogram (PSG) after a negative HSAT, the AHI and/or respiratory disturbance index were collected.

Results: 28.7% of 820 flow-based HSATs were negative for OSA. 35.8% of women vs. 18.8% of men had negative test ($p < 0.001$). Of 235 negative HSATs, only 18.3% of patients had a follow-up PSG (18% women vs 17% men). Women who had a PSG following a negative HSAT tended to be heavier (BMI 34.3 kg/m² women vs. 30.3 kg/m² men, $p=0.04$) and appeared sleepier (ESS 9.4 women vs 8.4 men, $p=0.28$) than men who had a follow-up PSG. Of those who had follow-up PSGs, 90% of women had an AHI3% > 5 (16% had an AHI4% > 5) and 100% of men had an AHI3% > 5 (36% had an AHI4% > 5).

Conclusion: Flow-based HSATs are twice as likely to be negative in women vs men by REI4% scoring criteria. If follow-up in-lab PSG testing is performed, the majority of women and men will meet the AASM definition for OSA.

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0574

FALSE NEGATIVE RATE OF SINGLE-NIGHT HOME SLEEP APNEA TESTING FOR CPAP QUALIFICATION: EVIDENCE FROM MULTI-NIGHT ANALYSIS

Vikas Jain, Stefen Yang, Kayden Amador, Kyla Marquez
Dream Center for Sleep & Circadian Sciences

Introduction: Single-night home sleep apnea testing (HSAT) is a clinical practice currently used to determine a patient's CPAP eligibility (AHI > 5). Although useful, there is variability in night-to-night results, which may lead to false-negative conclusions. Consequently, patients who would qualify on subsequent nights may be denied treatment. The extent of this issue has not been identified.

Methods: We examined 4,197 de-identified patients with multi-night HSAT data using 3% desaturation criteria. (Each patient had about 2-7 nights each, totaling 12,008 nights in total). Patients were tagged as night-1 negative if the initial study showed an sAHI < 5. We determined how many of these initially negative patients later demonstrated sAHI ≥ 5 on later nights, representing false negatives for CPAP qualification.

Results: 449 or 10.7% of the 4,197 patients analyzed had a negative initial study (night-1 sAHI < 5). Among these initially negative patients, 224 or 49.9% subsequently demonstrated sAHI ≥ 5 on one or multiple additional nights. This represents false negatives who would have been denied CPAP based solely on single-night testing.

Conclusion: Among the patients who completed a single-night HSAT, roughly 50% of those patients whose test results came back as negative actually had sleep apnea and qualified for CPAP. By utilizing multi-night testing protocols, it will ensure that patients receive proper treatment, have access to CPAP therapy, and ultimately reduce the rate of false negatives in sleep apnea. These findings are crucial for clinical practice procedures, insurance coverage policies, and guarantees that those with genuine sleep apnea aren't overlooked.

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0575

HOME SLEEP APNEA TEST MODIFIED HYPOPNEA SCORING CRITERIA MORE ACCURATELY CORRELATES TO SAME NIGHT IN-LAB POLYSOMNOGRAM

Jaclyn Faulk¹, Phillip Cushman², Matthew Brock³, Zahari Tchopov³, Nolan Carlile¹, Ryan Matheson¹, Alexandra Ables¹, Amanda Radtke¹, H. Scheuller³

¹San Antonio Uniformed Services Health Education Consortium,

²Wright-Patterson AFB, ³Wilford Hall Ambulatory Surgical Center

Introduction: Home sleep apnea testing (HSAT) improves access and lowers cost, but diagnostic accuracy remains limited. Sensitivity/specificity for moderate-to-severe obstructive sleep apnea (OSA) have been reported to be 80%/74%, with lower accuracy in mild disease. HSATs lack electroencephalography (EEG) and therefore the ability to score arousal-based events per AASM Recommended polysomnogram (PSG) scoring criteria. Alternative HSAT scoring criteria to improve concurrence with gold-standard PSG have been explored. We recently proposed modified scoring

in which hyperpneas following qualifying hypopneas act as surrogate arousals. This enables scoring without EEG, potentially improving diagnostic performance. In this study, we prospectively evaluated this modified scoring method by performing simultaneous in-lab PSG and HSAT recordings and comparing results.

Methods: Patients undergoing clinically indicated PSG at our sleep center (Aug 2025–Feb 2026) also wore type 3 HSAT equipment. Recordings were time-synchronized to compare respiratory event detection between devices. Three AHI values were calculated: (1) gold-standard PSG (pAHI), (2) conventional HSAT (cAHI), and (3) modified HSAT scoring using hyperpneas after flow limitations as surrogate respiratory arousals (mAHI).

Results: Seventeen patients completed the protocol (23% female; age 20–57 years; pAHI 1.8–80.9/hr; BMI 20–44.5). Modified scoring improved accuracy compared to cAHI using the absolute difference in AHI from pAHI (mean absolute difference between pAHI and mAHI = 4.98/hr (SD=5.63) vs mean absolute difference between pAHI and cAHI = 7.96/hr (SD=8.59), $p=0.043$ for calculated paired difference). PSG agreement improved (mean mAHI difference from pAHI = -1.65/hr, $p = 0.374$) compared to cAHI, which significantly underestimated AHI (mean cAHI difference from pAHI = -7.28/hr, $p = 0.0049$). Compared to pAHI, cAHI changed OSA diagnosis in 2 (11.8%) and OSA severity in 7 (41.2%) whereas mAHI changed OSA diagnosis in 1 (5.9%) and severity in 4 (23.5%).

Conclusion: Modified HSAT scoring demonstrated superior alignment with PSG and mitigated AHI underestimation seen with desaturation-only scoring. Incorporating physiologically relevant respiratory events into HSAT interpretation may narrow the performance gap between home and in-lab testing and offer meaningful cost savings by negating the requirement for follow-up sleep studies or reducing the number of follow-up PSG studies needed. Additional studies are indicated to further validate these findings.

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0576

NIGHT-TO-NIGHT VARIABILITY IN MULTI-NIGHT HOME SLEEP APNEA TESTING: COMPARISON OF 3% VERSUS 4% DESATURATION CRITERIA

Vikas Jain, Stefen Yang, Kyla Marquez, Lauren Bryan, Sanjana Poonuru

Dream Center for Sleep & Circadian Sciences

Introduction: Single-night home sleep apnea test (HSAT) remains the standard method to diagnose obstructive sleep apnea (OSA). However, night-to-night variability can introduce diagnostic inconsistencies. How much these variations are influenced by specific oxygen desaturation criteria used is still unclear, highlighting the need for further clarification on their impact on measurement stability.

Methods: We identified 4,197 patients who completed multi-night HSAT monitoring (mean 2.86 nights, range 2–7), during which both 3% and 4% oxygen desaturation indices were recorded concurrently. For each night, we calculated the sleep-adjusted apnea hypopnea index (sAHI). Night-to-night variability for each patient was evaluated using the coefficient of variation (CV). We then compared variability measures between the 3% and 4% desaturation thresholds and examined how these differences might influence diagnostic reliability.

Results: A total of 4,197 patients (mean age 54.3 ± 13.8 years) recorded 12,008 HSAT nights. Significant night-to-night variability in sAHI was observed for both desaturation criteria. Using the 3% desaturation threshold, the mean coefficient of variation (CV) was 25.41% (median 21.37%). Similarly, the variability observed using the 4% desaturation threshold had a mean CV of 30.20% (median 25.84%). Furthermore, when determining OSA severity from a single night of testing, 32.31% of patients were misclassified compared to their multi-night average severity using the 3% criterion. A misclassification rate of 32.57% was also observed with the 4% criterion. The statistically insignificant difference in misclassification rates between the two scoring methods (0.26 percentage points) indicates that both desaturation thresholds are comparably influenced by physiologic variability across nights.

Conclusion: Home sleep apnea testing shows considerable night-to-night fluctuation, regardless of whether a 3% or 4% desaturation threshold is applied. Nearly one-third of patients would receive an incorrect severity classification if diagnosis were solely based on a single night of testing. These results highlight the value of multi-night testing for improving diagnostic accuracy, avoiding treatment decisions based on unrepresentative data. The comparable variability seen with both desaturation criteria suggests that the challenge lies in the inherent physiologic variability of sleep apnea rather than in the choice of the threshold itself.

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0577

PRINCIPAL COMPONENT ANALYSIS IDENTIFIES DISTINCT SLEEP-BURDEN PHENOTYPES IN A CLINICAL COHORT OF OVER 4000 PATIENTS

Alice Albrecht¹, Yi Fang¹, Haoqi Sun², Sasha Milton¹, Ankit Parekh³, Robert Thomas², M. Brandon Westover², Yue Leng¹

¹University of California, San Francisco, ²Beth Israel Deaconess Medical Center, ³Icahn School of Medicine at Mount Sinai

Introduction: Obstructive sleep apnea (OSA) is one of the most common sleep disorder and can be characterized with multiple physiological burdens: hypoxic burden (HB), ventilatory burden (VB), and arousal burden (AB). To better capture patterns across these dimensions, we applied principal component analysis (PCA) to derive axes integrating multiple burdens and examine their relation to demographic and cardiometabolic phenotypes in sleep clinic patients.

Methods: We analyzed 4,329 adults (mean age 49.7 ± 15.4 y, 50.8% female, 20.4% non-White, 41.6% overweight) who underwent diagnostic in-laboratory polysomnography at Massachusetts General Hospital (2010–2020) through the Human Sleep Project. PCA was applied to 31 features, including HB (cumulative oxygen desaturation), VB (low-amplitude breathing), AB (total arousal duration), Apnea-Hypopnea Index (AHI), and Respiratory Disturbance Index (RDI), measured across the whole night (WN), NREM, and REM, along with sleep-architecture features. Associations with demographic or cardiometabolic variables were assessed using t-tests with Cohen's d. For each principal component, we calculated the associations of the component score with variables including age (>50 y vs ≤ 50 y), sex, BMI, race, hypertension, and diabetes.

Results: PCA revealed two primary components (PC1: 29.7%; PC2: 12.9% variance explained), subsequent components contributed $< 10\%$ each. PC1 represented a global respiratory-burden phenotype, primarily driven by WN and NREM HB (apnea-related

HB loadings: 0.28, 0.27; overall HB loadings: 0.25, 0.25), AHI and RDI (loadings: 0.30, 0.30), with additional contributions from AB and VB, and minimal influence from sleep-architecture features. Higher PC1 scores occurred in older, male, White, overweight individuals ($p < 0.001$, $d = 0.83$). PC2 defined a sleep-continuity phenotype, with higher sleep efficiency (loading: 0.42), total sleep time (loading: 0.36), lower wake after sleep onset (loading: -0.39) and sleep fragmentation (loading: -0.31), minimally influenced by respiratory burden. Higher PC2 scores occurred in younger, non-White women without hypertension or diabetes ($p < 0.001$, $d = 0.34$).

Conclusion: In 4,329 adults, PCA identified two interpretable sleep-burden phenotypes: a high respiratory-burden phenotype in older White males with elevated BMI, and a protective sleep-continuity phenotype in younger, non-White women without hypertension or diabetes. These findings demonstrated that demographic and cardiometabolic factors aligned with distinct physiologic burdens.

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0578

INTEGRATING HYPOXIC BURDEN INTO MULTI-DIAGNOSTIC HOME SLEEP APNEA TESTING

Ravi Aysola¹, Kunal Agarwal², Brennan Torstrick³, Nancy Collop⁴

¹UCLA, ²Tidal Health, ³Huxley Medical, Inc., ⁴Emory University

Introduction: Sleep apnea associated hypoxemia contributes to cardiovascular morbidity and arrhythmogenesis in sleep disordered breathing (SDB). However, traditional home sleep apnea tests (HSAT) provide limited physiologic characterization. Hypoxic burden (HB)—the cumulative area under event-related desaturations—has emerged as a promising predictor of cardiovascular outcomes compared with AHI alone. Despite this, clinical familiarity, consensus thresholds, and payer recognition remain limited, due in part to lack of widespread availability on HSAT platforms. Multi-diagnostic systems that quantify HB alongside AHI and ECG-based arrhythmias may support broader adoption. We evaluated HB in adults undergoing SDB assessment using a multi-diagnostic chest-worn HSAT (SANSa, Huxley Medical, Inc.).

Methods: Adults referred for suspected SDB underwent single-night monitoring with a chest-worn HSAT capturing nine physiologic channels, including oximetry, respiration, and ECG. Automated algorithms calculated AHI-3% and HB for analysis. Cardiovascular comorbidity was defined as history of atrial fibrillation, arrhythmia, heart failure, coronary artery disease, or myocardial infarction.

Results: Data from 325 adults (mean age 55.4 ± 15.6 years, 47% male, BMI 33.7 ± 8.6 kg/m²) were analyzed. Mean HB was $49.8 \pm 80.2\%$ -min/hr. HB increased stepwise across OSA severity categories, from $4.3 \pm 3.0\%$ -min/hr in normal to $16.9 \pm 8.7\%$ -min/hr in mild, $36.7 \pm 15.6\%$ -min/hr in moderate, and $117.7 \pm 117.8\%$ -min/hr in severe SDB. HB was correlated with AHI ($R=0.76$, $P < 0.001$). Elevated HB ($\geq 60\%$ -min/hr) occurred in 23% (75/325), exclusively among those with moderate ($n=5$) or severe ($n=70$) SDB, with none in normal or mild categories. Elevated HB in moderate-to-severe SDB was associated with greater cardiac comorbidity compared to lower HB (OR: 2.4 [95% CI: 1.1, 5.1], $P=0.047$). Higher BMI ($P < 0.01$) and age ($P=0.03$) were associated with increased HB, though not after adjusting for AHI

($P=0.96$ and 0.54 , respectively). No significant effects on HB were observed by sex or race.

Conclusion: These results demonstrate that HB can be measured from a multi-diagnostic chest-worn HSAT to add important physiologic context during SDB assessment. Given that most SDB testing uses HSAT, integrating HB alongside AHI and other cardiac comorbidity measurements, such as ECG-derived arrhythmias, could improve patient phenotyping to determine appropriate treatment. Further research is needed to determine clinically meaningful HB thresholds and investigate how AHI, HB, and cardiovascular comorbidity could jointly stratify risk in diverse real-world populations.

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0579

FEASIBILITY OF A PATCH-TYPE ABDOMINAL SENSOR FOR SLEEP APNEA AND HYPOPNEA DETECTION: A VALIDATION STUDY

Jung Kyung Hong¹, Minji Lee², Jeong-Whun Kim¹, In-Young Yoon¹

¹Seoul National University Bundang Hospital, ²Soonchunhyang University Seoul Hospital

Introduction: Polysomnography (PSG) remains the standard for diagnosing sleep apnea but is limited by its high cost and in-lab setting. The ATP-T200 (ATsense, Korea) is a novel patch-type abdominal sensor that measures sleep respiration via capacitance changes reflecting distance between the patch electrode and the abdominal surface. This study evaluated its feasibility for detecting sleep respiratory events (apnea and hypopnea) compared with PSG recordings.

Methods: Adults (≥ 19 years) scheduled for PSG for clinical reasons were recruited. The patch-type sensor was attached to the abdomen simultaneously with standard in-lab PSG. Abdominal signals were pre-processed and initially screened for event candidates using a rule-based algorithm, followed by refined detection with the Abdomen Abnormal Detection Net (AADNet), an AI model that learns local respiratory patterns and temporal dependencies for accurate event classification. Data were divided 1:1 into training and test sets for model development and evaluation. The accuracy of apnea-hypopnea index (AHI) estimation and epoch-by-epoch event detection were assessed, and the area under the receiver operating characteristic curve (AUROC) values were calculated using AHI thresholds of ≥ 15 , and ≥ 30 events/h.

Results: After 8 were excluded due to poor signal quality, the final analysis included 88 participants (mean age 48.5 ± 15.5 years, 81% men, BMI 26.0 ± 4.2 kg/m²). Participants were randomly divided into training ($n = 44$) and test ($n = 44$) sets, stratified by sex, age, and BMI without significant group differences. For the AHI, strong correlation was observed between the patch-based and PSG measurements (Pearson $r = 0.902$, $p < 0.001$), and Bland-Altman analysis showed a mean difference of 0.82. When classifying patients by AHI thresholds, AUROC values were 0.963 for both AHI ≥ 15 (29/44; sensitivity 89.2%, specificity 85.7%) and AHI ≥ 30 (15/44; sensitivity 93.3%, specificity 93.1%). Epoch-by-epoch analysis demonstrated sensitivity 83.3%, specificity 91.6%, accuracy 89.5%, and F1-score 80.0.

Conclusion: The patch-type abdominal sensor showed strong agreement with PSG and accurately estimating AHI across clinically relevant thresholds. These findings support the feasibility of abdominal capacitance-based respiration monitoring combined

with AI-driven event detection as a practical approach for screening and follow-up outside the sleep laboratory.

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0580

SCORING WATCHPAT STUDIES WITH HYPOPNEA RULE 1A (3%) VS HYPOPNEA RULE 1B (4%), DOES IT MAKE A DIFFERENCE? - A RETROSPECTIVE PILOT STUDY

Andrew Vela, Boyd Hehn

Robert Packer Hospital/Guthrie Clinic

Introduction: Sleep disturbance from respiratory physiology includes a spectrum of disorders associated with snoring, upper airway resistance, and sleep apnea. In the past, treatment of sleep apnea was largely based on its severity as judged by AHI and clinical symptoms. However, increasingly, treatment decisions are being made based on the presence or absence of cardiovascular comorbidities and risk factors. Medicare and many insurance providers require hypopnea to be scored utilizing AASM hypopnea rule 1B (a 4% drop in oxygen saturation). However, this may not be appropriate for younger patients who would be expected to have less desaturation during a respiratory event. This retrospective pilot study examined whether the frequency in which using 3% hypopnea rule vs. 4% hypopnea rule changes reported severity and therefore may affect medical decisions made regarding treatment.

Methods: Deidentified data from 24 WatchPat sleep studies were analyzed from a sleep practice which primarily serves a rural community. Results were categorized in terms of severity of mild, moderate, and severe based on Hypopnea Rule 1A (3%) against Hypopnea Rule 1B (4%) the latter which is utilized by Medicare.

Results: Of the 24 studies, 8 had different categories of severity when classification was changed from Rule 1A to Rule 1B. The age group of 20 to 29 was the most greatly affected by the change in classification with 75% of respondents in this category reporting a change.

Conclusion: WatchPat studies using Rule 1B scoring resulted in a noticeable underestimation of sleep apnea severity among patients aged 20 to 29 when compared with Rule 1A on WatchPAT studies. These findings suggest that reliance on Rule 1B may overlook clinically meaningful respiratory events in younger adults. However, interpretation should be tempered by the small sample size, and larger studies are needed to confirm these age-specific differences.

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0581

VALIDATION OF TOTAL SLEEP TIME AND APNEA HYPOPNEA INDEX FROM EEG AND SATURATION MEASUREMENTS OF FULL NIGHT WEARABLE DRY PRINTED ELECTRODE SYSTEM

Thomas Penzel¹, Ingo Fietze², Degani Barak-Shinar³, Katharina Lederer⁴, Yael Hanein⁵, Rona Haker³, Daniel Possti³, Shani Oz³

¹Charité - Universitätsmedizin Berlin, ²Charite, ³X-trodes Ltd.,

⁴Advanced Sleep Research, ⁵Tel-Aviv University

Introduction: Quantitative assessment of sleep is essential for diagnosing sleep disorders and evaluating treatment efficacy. Polysomnography (PSG), in a laboratory setting, is considered the gold standard for objective sleep assessment, however PSG is resource-intensive, expensive, and can disrupt a patient's normal sleep pattern. Wearable devices based on dry-printed electrode arrays have emerged as a practical and accessible promising alternative to traditional PSG for skin electrophysiology during sleep. Dry printed electrodes offer several advantages, such as signal stability, ease of application especially in the home environment setting, and patient convenience. While wearable devices offer a convenient and simple solution, their accuracy, and particularly concerning metrics like Total Sleep Time (TST) and Apnea Hypopnea Index (AHI), must be validated against the established gold-standard in-laboratory polysomnography. In previous studies we showed accuracy to polysomnography signals and basic sleep stages scoring. This study compares TST and AHI measurements obtained from manual scoring from the tested wearable device with those derived from full PSG.

Methods: This validation study included 10 healthy subjects as a preparation for additional 40 subjects with suspected sleep disorders. Each subject was connected to both systems simultaneously, the PSG and the tested system. The subjects were monitored during a complete night in a sleep facility. The tested system comprises two novel multi-electrode patches for face and chest including EEG, EOG, EMG, ECG, SpO2 wrist sensor, a wireless recording device, and a mobile application. The raw data from both systems scored manually by the same scorer and compared for validation purposes. The Oxygen Desaturation Index (ODI) scored manually from the SpO2 of the tested device and was compared to the AHI of the PSG.

Results: The agreement between the TST values of both systems ranged from 93% to 98.8% with an average of 96.5%. Comparing the Oxygen Desaturation Index (ODI) to the AHI of the full PSG shows good agreement with higher correlation in higher values of AHI.

Conclusion: The parameters agreement of the healthy subjects between the systems is very successful and promising toward the challenge of acquiring high quality medical grade signals at home environment during full night of sleep.

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0582

APNEA-HYPOPNEA INDEX AT THE US / MEXICO BORDER: PREVALENCE AND SOCIODEMOGRAPHIC CORRELATES OF CLINICAL CUTOFFS - DATA FROM THE NOCHES STUDY

Sherap Sangpo¹, Michael Amadei¹, Andrea Diaz-Pacheco¹, Patricia Molina¹, Patricia Haynes¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Sairam Parthasarathy¹, Velarie Ansu⁴, Suzanne Gorovoy⁵, Azizi Seixas⁴, Mascha Korsch⁴, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Miami, ⁵University of Arizona College of Medicine

Introduction: Sleep disordered breathing is under-studied among Hispanics/Latinos, especially in communities where sociocultural and clinical risk factors may contribute to disease burden.

Methods: Study participants were 992 adults ages 25-60 years residing along the US-Mexico Border. Apnea-Hypopnea Index (AHI) was determined from home sleep tests (Embletta) and scored by certified polysomnographic technicians using the 3% criterion. Results were characterized as None (0.0-4.9), Minimal (5.0-9.9), Mild (10.0-14.9), Moderate (15.0-29.9), and Severe (30+). Potential correlates included language (English or Spanish), age, gender, education, length of time in the US, financial status, hypertension, diabetes, and Anglo and Mexican acculturation (ARSM-II), Americanism, Hispanicism, and Biculturalism (BIQ), and objective Body Mass Index (BMI). Penalized logistic regressions using the LASSO regression with tenfold cross-validation was used to determine the optimal regularization parameter and select predictors that contributed meaningfully to classification of each cutoff. Following model convergence, the non-zero coefficients identified were extracted for downstream modeling. This was followed by a multinomial logistic regression to determine factors that differentiate each category from None.

Results: Prevalence of AHI categories was None (61.5%), Minimal (21.4%), Mild (7.7%), Moderate (5.6%), and Severe (4.2%). The most parsimonious model differed across categories. For Minimal ($\lambda=0.0148$; $CV\approx 1.24$), non-zero predictors included age, gender, BMI, immigration, financial status, Mexican acculturation, hypertension, and diabetes. For Mild ($\lambda=0.0209$; $CV\approx 1.04$), non-zero predictors were gender, immigration, and hypertension. For Moderate ($\lambda=0.0139$; $CV\approx 0.53$), the coefficients were age, BMI, and language. For Severe ($\lambda=0.0126$; $CV\approx 0.41$), the non-zero predictors were age, BMI, and hypertension. A multinomial logistic model with only these variables demonstrated significant associations between male gender (RRR=2.28) and hypertension (RRR=1.73) for Minimal; age (RRR=1.04/yr), male gender (RRR=2.42), and BMI (RRR=1.09/pt) for Mild; age (RRR=1.06/yr), male gender (RRR=2.47), BMI (RRR=1.11/pt), and hypertension (RRR=2.50) for Moderate; and age (RRR=1.07/yr), male gender (RRR=4.92), BMI (RRR=1.18/pt), and >20 years in the US (RRR=0.21) with being in the Severe range.

Conclusion: Sleep apnea was highly prevalent in this cohort at the US-Mexico border. Using a machine-learning strategy, the strongest correlates were age, gender, BMI, and hypertension. These may serve as effective risk factors for identifying individuals at high-risk in the Hispanic/Latinx border communities

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0583

APNEA-HYPOPNEA INDEX AT THE US / MEXICO BORDER: SOCIODEMOGRAPHIC AND HEALTH CORRELATES AND FREQUENT SNORING AS A MARKER OF RISK

Nadia Sardjev¹, Michael Amadei¹, Dorothy Tung¹, Andrea Diaz-Pacheco¹, Patricia Molina¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Suzanne Gorovoy⁴, Sairam Parthasarathy¹, Girardin Jean-Louis⁵, Debbie Chung⁵, Mascha Korsch⁵, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Arizona College of Medicine, ⁵University of Miami

Introduction: Little is known about how sleep-disordered breathing is experienced in border communities. This study examines

how Apnea-Hypopnea Index (AHI) in this community is related to demographic and health characteristics.

Methods: Data were collected from 992 working-age adults (age 25-60) living at the US-Mexico Border. AHI was determined from Embletta home sleep tests scored by certified polysomnographic technicians, using the 3% hypopnea criterion. To assess demographic correlates of AHI, we examined self-reported age, gender, education, length of time in the US, financial status, hypertension, diabetes, and both Anglo and Mexican acculturation, as well as objective Body Mass Index (BMI). All regression analyses included age, sex, and BMI as covariates. Frequent snoring was self-reported as being 3 nights/week or more. Interaction terms examined interactions between frequent snoring and each correlate, adjusted for all others.

Results: The mean AHI in the sample was 3.6 (SD=9.7, Range 0.0-89.2, IQR 1.4-7.3). Frequent snoring was reported in 22.3%. Higher AHI was associated with older age (B=0.15/yr), BMI (0.39/point), hypertension (B=2.63), and frequent snoring (B=4.33). Lower AHI was associated with being female (B=-4.09), family living in the US >20 years vs < 10 years (B=-2.37). Significant interactions with frequent snoring were seen for gender, BMI, education, immigration, Mexican acculturation, Anglo acculturation, and diabetes. Interactions demonstrate an increased influence of frequent snoring on AHI for higher BMI, higher education, <=10 years or 16-20 years in the US, lower levels of Mexican acculturation, lower levels of Anglo acculturation, and lack of diabetes.

Conclusion: AHI differs meaningfully across several background and health-related factors in this population. Frequent snoring was strongly associated with higher AHI, suggesting that this symptom may help identify adults at greater risk. The strength of this relationship varied across groups, indicating that the relevance of frequent snoring is not consistent. Future analyses will explore how these and other factors may influence future case-finding efforts.

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0584

ASSOCIATION OF NOVEL POLYSOMNOGRAPHIC PARAMETERS WITH CHARLSON COMORBIDITY INDEX AND MORTALITY RISK IN SLEEP APNEA

Sikawat Thanaviratananich¹, Hao Cheng², Kulrithra Pisanuwongrak¹, Dittapol Muntham³, Krishna Sundar⁴

¹Cleveland Clinic, ²VA Hospital, ³University of Technology Suvarnabhumi, ⁴UC Davis Medical Center

Introduction: Previous studies demonstrate an association between conventional polysomnographic parameters, including apnea-hypopnea index (AHI), respiratory disturbance index, and oxygen desaturation index, and increased mortality risk in patients with sleep apnea. Given the drawbacks of these conventional parameters, this study aims to explore the association between novel polysomnographic parameters—oxygen desaturation rate (ODR), oxygen resaturation rate (ORR), cumulative hypoxic burden (HBc), and event-specific hypoxic burden (HBc)—and the Charlson Comorbidity Index (CCI), a 10-year mortality risk score, as well as its relative Charlson mortality risk (CMR).

Methods: This cross-sectional study included patients who underwent diagnostic polysomnography. Conventional and novel polysomnographic parameters were analyzed for their correlation

with CCI and CMR at the time of the study. Stepwise linear regression was used to identify predictors of CCI.

Results: A total of 1,505 patients (498 no OSA, 724 mild, 219 moderate, 65 severe; mean age 44 years) were analyzed. CCI and CMR were higher in patients with OSA than without (1.7 ± 1.92 vs. 1.42 ± 1.63 , $p < 0.001$; 14.33% vs 10.8% , $p = 0.022$) and increased with OSA severity (mild 1.68 ± 1.91 , moderate 1.70 ± 1.97 , severe 1.97 ± 1.85 ; $p < 0.001$). All polysomnographic parameters, except ODR, significantly correlated with CCI and CMR. Stepwise regression identified minSpO₂, baselineSpO₂, and ORR as independent predictors of both CCI (coefficients -1.59 , -5.97 , 83.81 ; $p = 0.035$, 0.035 , 0.023) and CMR (-24.63 , -71.92 , 976.84 ; $p = 0.006$, 0.034 , 0.026). When CCI was grouped as no comorbidity (0), low (1–2), moderate (3–4), and high (≥ 5), ORR increased progressively with risk (0.345 , 0.360 , 0.367 , 0.375% ; $p = 0.001$).

Conclusion: Our study identified novel polysomnographic parameters, including HbC, HbE, and ORR, as associated with CCI and CMR. Among these, ORR was the only independent predictor of both CCI and CMR, alongside conventional parameters minSpO₂ and baselineSpO₂. Higher ORR may increase reactive oxygen species, contributing to greater comorbidities and higher CCI. ORR represents a promising novel marker for further exploration in the context of OSA and mortality risk.

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0585

PREVALENCE, RISK FACTORS AND RESPIRATORY EVENTS DISTRIBUTION IN ADULT WITH DOWN SYNDROME

Rohan Bellary¹, Jawad Kahir¹, Karim El-Kersh², Egambaram Senthilvel¹

¹University of Louisville School of Medicine, ²University of Arizona School of Medicine

Introduction: Obstructive sleep apnea (OSA) is highly prevalent in adults with Down syndrome (DS) due to various risk factors. The aim of this study is to evaluate the prevalence, risk factors, and respiratory event distribution in adults with DS compared to randomly assigned age, gender, and BMI matched normal adults presented with snoring.

Methods: This was a single-center retrospective study involving adults with DS who underwent first-time overnight polysomnography (PSG). OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 5 events/hr), mild ($5-15$ events/h), moderate ($15.1-30$ events/h), or severe (≥ 30 events/h).

Results: Twenty-eight DS adults PSGs were compared with 28 age, gender, and BMI controlled snoring adults. The mean age was 32.8 years, 64% were females, and the mean BMI was 36.1 in both groups. Hypothyroidism (50% vs 10.7% , $p = 0.002$) and congenital heart disease (32% vs 7% , $p = 0.035$) were significantly more common in DS. OSA prevalence was 82% in DS and 63% in controls. DS had increased wake after sleep onset time ($p = 0.028$) and N3 ($p = 0.033$) and decreased N2 ($p = 0.010$) and REM ($p = 0.014$) sleep compared to the control group. PSG demonstrated significantly higher AHI 20.6 (8.8 , 60.5) vs 7.1 (2.6 , 20.6), $p = 0.010$; worse SpO₂ nadir 79.0 (71.0 , 86.5) vs 86.5 (80.0 , 90.0), $p = 0.004$; and higher oxygen desaturation time spent below 88% , 4.5 (0.4 , 37.4) vs 0.2 (0.0 , 3.0), $p = 0.004$ in DS. After adjusting for age and BMI, the odds

of having an abnormal AHI (≥ 15) are 5.96 times higher in the Down Syndrome group compared to the control group ($p = 0.038$). Total median REM time was less in DS with OSA ($p = 0.014$). Non-REM AHI ($p = 0.019$) and supine AHI ($p = 0.018$) were higher in DS compared to the control group.

Conclusion: Adults with DS had a high prevalence of OSA compared to matched adults, and more than two-thirds of the DS patients had moderate to severe OSA. After adjusting for age and BMI, the odds of having greater than moderate OSA were higher in the Down Syndrome group. Respiratory events occurred more in non-REM and supine sleep in DS group compared to the control.

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0586

THE MATHEMATICAL RELATIONSHIP BETWEEN BODY MASS INDEX AND APNEA-HYPOPNEA INDEX IN WOMEN AND MEN

Brittany Koontz¹, Linder Wendt², Deema Fattal¹

¹Carver College of Medicine, University of Iowa, ²Institute for Clinical and Translational Science, University of Iowa

Introduction: High body mass index (BMI) is a risk factor for obstructive sleep apnea (OSA). The apnea-hypopnea index (AHI) approximates OSA severity. Since BMI and AHI are positively correlated, a mathematical formula may estimate the impact of BMI on AHI. Multiple studies have proposed a positive correlation between BMI and AHI. One study evaluated 690 patients (56% male, 44% female) with OSA, and found that, in all, a 10% BMI increase correlated with a 32% AHI increase. In our prior study of 434 Veterans, we found that for every 1-unit drop in BMI ($5-7$ lb.), one could expect a 6.2% decrease in AHI. In another 598 of our Veterans, a 1-unit drop in BMI was associated with a 6.6% decrease in AHI. But our Veteran samples consisted of $>90\%$ men. A female sample would be important, due to the different obesity patterns between women and men. For a given BMI, women have less fat-free mass than men, and fat distribution is peripheral in women and centralized in men. This may affect the relationship between BMI and AHI in women and men. Therefore, we obtained a new sample with females.

Methods: We reviewed 1000 random charts of female and male patients (aged 18-89 years) who had polysomnograms at the University of Iowa between 2019-2024. Log-transformed linear regression models and Spearman's correlation evaluated the relationship between BMI and AHI.

Results: Of the 1000 charts, 193 were excluded due to incomplete data. The final sample was 807 patients: 473 (58.6%) females and 334 (41.4%) males. Linear regression models estimated that a 1-unit BMI decrease corresponded with a 6.3% decrease in AHI in females, and 6.5% decrease in males. Spearman's correlation found that BMI and AHI were positively associated in both sexes ($\rho = 0.37$, $p < 0.001$).

Conclusion: The formulas were not significantly different between sexes. We conclude the relationship between BMI and AHI is the same in females and males. A 1-unit drop in BMI results in a 6-7% decrease in AHI in both sexes. Healthcare workers could encourage female and male patients to lose 6-7 lbs. to improve AHI by 6-7%.

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0587

UNDER-DIAGNOSIS OF SLEEP APNEA AT THE US / MEXICO BORDER – DATA FROM THE NOGALES CARDIOMETABOLIC HEALTH AND SLEEP STUDYMichael Amadei¹, Dorothy Tung¹, Andrea Diaz-Pacheco¹, Patricia Molina¹, Patricia Haynes¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Suzanne Gorovoy⁴, Girardin Jean-Louis⁵, Velarie Ansu⁵, Sairam Parthasarathy¹, William Killgore¹, Michael Grandner¹¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Arizona College of Medicine, ⁵University of Miami

Introduction: Sleep apnea is both underdiagnosed and under-treated in the US. Few studies have examined the gaps in border communities where access to specialized sleep care may be limited. This study quantifies the rates of underdiagnosis and identified other risk factors in a cohort at the US-Mexico Border.

Methods: Data were collected from 992 working-age adults (age 25-60) living at the US-Mexico Border. Apnea-Hypopnea Index (AHI) was determined from Embletta home sleep tests scored by certified polysomnographic technicians using the 3% hypopnea rule. Results were classified as None (0.0-4.9), Minimal (5.0-9.9), Mild (10.0-14.9), Moderate (15.0-29.9), and Severe (30+). Actual diagnosis of sleep apnea was assessed in a detailed medical history interview. Cross-tabs and Receiver-Operator Curves (ROCs) were computed, with post-hoc McNemar's test to evaluate systematic under-diagnosis at each diagnostic cutoff. Logistic regression analysis examined sociodemographic correlates. Future analyses will incorporate symptom reports to ascertain diagnoses for AHI < 15.

Results: Prevalence of sleep apnea categories in the sample was None=61.51%, Minimal=21.35%, Mild=7.36%, Moderate=5.57%, and Severe=4.21%. Based on an AHI cutoff of 5.0, 22 of 406 cases were diagnosed, representing 94.6% under-diagnosis, 5.4% sensitivity but 98.5% specificity, and ROC of 0.52. McNemar's test was significant ($X^2 = 357.82$, $p < 0.0001$), indicating under-diagnosis. Based on an AHI cutoff of 10, 12/161 cases were diagnosed, representing 92.5% under-diagnosis, 7.5% sensitivity but 97.7% specificity, and ROC of 0.53. McNemar's test was significant ($X^2 = 102.76$, $p < 0.0001$). Based on an AHI cutoff of 15, 7/93 cases were diagnosed, representing 92.5% under-diagnosis, 7.5% sensitivity but 97.3% specificity, and ROC of 0.52. McNemar's test was significant ($X^2 = 36.41$, $p < 0.0001$). Being underdiagnosed according to the AHI ≥ 5 criterion was associated with higher Mexican acculturation (OR=2.31/pt) and negatively related to higher BMI (OR=0.92/pt).

Conclusion: Sleep apnea is highly under-diagnosed in this US-Mexico border sample, with 90-95% of cases currently under-diagnosed, thus exceeding national estimates of under-diagnosis. The study highlights the urgent need to increase case-finding efforts and awareness, especially among Mexican acculturation and less severe BMI.

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0588

SLEEP BELOW 90: A SIMPLE OXIMETRIC INDEX THAT INTEGRATES HYPOXIC BURDENNathalia Lemos¹, Paula Alana Seixas¹, Laís Mota², Henrique Terceiro¹, Miguel Cruz³, Cristina Salles²¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Universidade de Portugal

Introduction: Introduction: The Time Spent with Saturation below 90% (TS< 90%) is a marker for the severity of nocturnal hypoxemia. Objective: To evaluate the association between TS< 90%, Heart Rate (HR), Oxygen Desaturation Index (ODI), and Hypoxic Burden (HB) in patients with Obstructive Sleep Apnea (OSA).

Methods: Methods: This was a cross-sectional study, nested within a cohort, where 36 individuals were evaluated, 58.1% of whom were women, with a mean age of 53.95 ± 11.86 years. Patients with OSA were included, and measurements of Body Mass Index (BMI), ODI, HR, SO₂, TS< 90%, and HB were collected. HB was measured using the formula considering the area under the curve of oxyhemoglobin desaturation > 3%.

Results: Results: The sample presented BMI 30.77 ± 8.06 ; ODI 19.89 ± 43.64 ; HB 93.07 ± 181.10 ; Minimum SpO₂ = 82.23 ± 11.90 ; Mean SpO₂ = 93.55 ± 5.73 ; Maximum SpO₂ = 140.14 ± 192.06 ; TS< 90% = 51.75 ± 124.47 ; Number of Hypoxemic Events 0.73 ± 2.53 ; Total Time in Hypoxemia 12.36 ± 48.29 ; Minimum HR 52.32 ± 6.95 ; Maximum HR 110.09 ± 11.71 ; Δ HR 39.73 ± 11.32 . A correlation was observed between TS< 90% and: HB ($r = 0.487$; $p = 0.022$); ODI ($r = 0.492$; $p = 0.020$); Age ($r = 0.027$; $p = 0.907$), BMI ($r = 0.357$; $p = 103$); Minimum HR ($r = 0.027$; $p = 0.906$); Mean HR ($r = 0.414$; $p = 0.056$); Maximum HR ($r = 0.047$; $p = 0.836$); Δ HR ($r = 0.396$; $p = 0.068$); Minimum SpO₂ ($r = 0.486$; $p = 0.000$); Mean SpO₂ ($r = 0.691$; $p = 0.000$); Maximum SpO₂ ($r = 0.098$; 0.644); Number of Hypoxemic Events ($r = 0.784$; $p = 0.000$); Total Time in Hypoxemia ($r = 0.650$; $p = 0.001$).

Conclusion: Conclusion: In this study, TS< 90% showed a robust correlation with HB, ODI, number of desaturations, and total time in hypoxemia, in addition to being strongly associated with the drop in minimum and mean SpO₂. These findings suggest that TS< 90% can function as a simple, direct, and highly informative marker of nocturnal hypoxemia.

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0589

CONCOMITANT AROXYBUTYNIN AND ATOMOXETINE (AD109) WITH GLP-1 AGONISTS: AN ANALYSIS OF THE SYNAIRGY AND LUNAIRO TRIALS IN OBSTRUCTIVE SLEEP APNEAPatrick Strollo¹, Huy Pho², Neomi Shah³, Richard Schwab⁴, Virend Somers⁵, Laura Gell², Ron Farkas², Luigi Taranto-Montemurro², John Cronin², Sanjay Patel⁶

¹Veteran Affairs Pittsburgh Healthcare System, ²Apnimed, Inc., ³Division of Pulmonary, Critical Care and Sleep Medicine, Icahn School of Medicine at Mount Sinai, ⁴University of Pennsylvania Perelman School of Medicine, ⁵Mayo Clinic, ⁶Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: AD109, an investigational oral anti-apneic neuromuscular modulator, combines in one tablet the novel antimuscarinic, aroxbutynin (2.5 mg), with the selective norepinephrine reuptake inhibitor, atomoxetine (75 mg). AD109 significantly improved the apnea-hypopnea index and oxygenation vs placebo (PBO) in two phase 3 clinical trials in OSA. This exploratory analysis evaluated concomitant administration of AD109 with glucagon-like peptide-1 receptor agonists (GLP-1 RA) on weight change in OSA.

Methods: SynAIRgy (NCT05813275; N=646) and LunAIRo (NCT05811247; N=660) were randomized, double-blinded, PBO-controlled, parallel-arm phase 3 trials of AD109 vs PBO in adults with mild-to-severe OSA (AHI >5) who failed or refused positive airway pressure therapy. Participants must have had a body mass index (BMI) 18.5–40 kg/m² for males / 18.5–42 kg/m² for females. Participants receiving GLP-1 RA for diabetes were permitted. Body weight was assessed throughout the trials.

Results: One-hundred and six participants were enrolled in the phase 3 trials taking a GLP-1 RA for diabetes (PBO+GLP-1 RA: n=48; AD109+GLP-1 RA: n=58). In participants receiving a GLP-1 RA with baseline BMI < 30, AD109 reduced weight by 2.7% (vs PBO: -1.4%, P=0.08) and 0.5% (vs PBO: 2.3%, P=0.60) at Week 26 and Week 51, respectively. In participants receiving a GLP-1 RA with baseline BMI 30 to 34.9, AD109 reduced weight by 0.9% (vs PBO: 1.2%, P=0.84) and 2.5% (vs PBO: 3.3%, P=0.85) at Week 26 and Week 51, respectively. In participants receiving a GLP-1 RA with baseline BMI ≥35, AD109 reduced weight by 5.5% (vs PBO: 0.9%, P=0.02) and 11.5% (vs PBO: 3.8%, P=0.04) at Week 26 and Week 51, respectively. Participants not receiving GLP-1 RA (n=979) showed smaller weight reductions across BMI classes; in participants with BMI ≥35, AD109 reduced weight by 1.4% (vs PBO: 0.2%, P=0.002) and 2.8% (vs PBO: 1.4%, P=0.19) at Week 26 and Week 51, respectively.

Conclusion: In this exploratory analysis using pooled data from SynAIRgy and LunAIRo, results indicate that participants with a baseline BMI ≥35 receiving AD109+GLP-1 RA experienced progressively greater weight loss over time relative to GLP-1 RA alone. Future studies are needed to further evaluate concomitant administration of AD109+GLP-1 RA in OSA.

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0590

CLINICAL PREDICTORS OF POSITIVE AIRWAY PRESSURE THERAPY ADHERENCE: A COMPARATIVE ANALYSIS OF PHYSIOLOGICAL AND PATIENT-REPORTED OUTCOMES

Ryan Cobb¹, John Lin², Karel Calero³

¹University of South Florida, ²USF Morsani College of Medicine, ³James A. Haley Veterans Affairs Hospital

Introduction: Positive Airway Pressure (PAP) therapy remains the gold standard for Obstructive Sleep Apnea (OSA) treatment, yet sustained short and long-term adherence remains a significant clinical challenge. Although various physiological, symptomatic,

and device-related variables have been investigated for the prediction of adherence, the relative impact of each of these variables remains debated. This study assessed the impact of multiple variables—ranging from disease severity to subjective symptom scores—on 90-day PAP adherence to identify independent predictors of therapy adherence within a veteran population.

Methods: We conducted a retrospective chart review of 110 adult patients initiated on PAP therapy at the James A. Haley Veterans' Hospital in Tampa, Florida, between July and September 2025. All patients utilized the ResMed AirSense 10 Auto-PAP device. We analyzed the relationship between 90-day objective adherence and nine independent variables: Age, BMI, baseline Apnea-Hypopnea Index (AHI), SpO₂ Nadir, Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), NOSE score, Residual AHI, and 95% Leak. Statistical analysis included Multiple Linear Regression (MLR) to assess combined effects, followed by Simple Linear Regression (SLR) for individual variables.

Results: The cohort had a mean age of 58 (±14) years and a mean BMI of 31.65 (±5.06) kg/m². The average 90-day adherence rate for the group was 46%. The MLR model incorporating all nine variables did not reach statistical significance (p = 0.12). Within this multi-variable model, age approached significance (p = 0.09), while AHI showed a trend toward significance (p = 0.14). However, a subsequent SLR revealed a statistically significant positive correlation between baseline AHI and 90-day adherence (p = 0.013; Adjusted R² = 0.0465). Other variables, including subjective symptom scores (ESS, ISI, NOSE) and device metrics, did not show statistically significant correlations with adherence.

Conclusion: Our multi-variable model did not yield significant predictors, but individual targeted analysis identified baseline AHI as a statistically significant predictor of 90-day adherence. Notably, this model's low explanatory power suggests that adherence is primarily driven by non-measured factors. Future evaluation of predictors of PAP adherence in this population may benefit from further exploration of behavioral, psychological, and socio-economic variables to improve predictive utility and identify high-risk patients.

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0591

CLINICAL AND SOCIETAL IMPACT OF TIRZEPATIDE IN PATIENTS WITH MODERATE-TO-SEVERE OSA AND OBESITY: A LIFETIME MODELLING STUDY IN CHINA

Yi Xiao¹, Jean-Louis Pepin², Ron Grunstein³, Phil McEwan⁴, Michal Pochopien⁵, Anna Lanecka⁵, Yuchen Ding⁶, Emmanuel Bourmaud⁶, Eva Lau⁶, Helene Vioix⁶

¹Department of Pulmonary and Critical Care Medicine, Chinese Academy of Medical Sciences & Peking Union Medical College Hospital, ²University Grenoble Alpes, Inserm, CHU Grenoble Alpes, ³The Woolcock Institute of Medical Research, Macquarie University, ⁴Health Economics and Outcomes Research Ltd., ⁵Clever-Access, ⁶Eli Lilly and Company

Introduction: Obstructive sleep apnea (OSA) is associated with increased risk of stroke, coronary heart disease (CHD), resistant hypertension (RH), type 2 diabetes (T2D), depression, cancer, and road traffic accidents (RTA). We aimed to examine tirzepatide, a dual GLP-1/GIP receptor agonist, alongside lifestyle modification (LM) for its potential to improve clinical outcomes in patients with moderate-to-severe OSA and obesity.

Methods: A cohort-based Markov model was constructed to track clinical outcomes over a lifetime horizon in adults with moderate-to-severe OSA and obesity, with health states defined by apnea-hypopnea index categories to capture the full spectrum of OSA severity. Transition probabilities were derived from the SURMOUNT-OSA trial, assuming extrapolation beyond trial period. Simultaneously, average body mass index (BMI) was modelled across cycles to reflect weight changes over time. The model integrated baseline characteristics from East Asian patients of the SURMOUNT-OSA trial, and risks for complications sourced from general population data in China and adjusted for BMI-related risk amplification. Age- and gender-specific background mortality rates were included, along with OSA-specific mortality linked to stroke, CHD, and RTA. The direct impact of BMI on mortality was also incorporated.

Results: Over a lifetime simulation, the estimated clinical burden under LM alone was substantial, with the following number of non-fatal events per 1000 patients: 127 strokes, 179 cases of CHD, 161 cases of RH, 235 cases of T2D, 507 cases of depression, 71 cases of cancer, and 333 RTA. Adding tirzepatide to LM significantly reduced the clinical burden, avoiding approximately 21 strokes (-17%), 23 cases of CHD (-13%), 20 cases of RH (-12%), 80 cases of T2D (-34%), 20 cases of depression (-4%), 10 cases of cancer (-14%), and 46 RTA (-14%) per 1000 patients. Cumulative mortality was also lower with tirzepatide yielding approximately 4.8 additional months of life.

Conclusion: In this lifetime modelling study, tirzepatide, in addition to LM, was estimated to reduce the incidence of major clinical events and mortality in patients with moderate-to-severe OSA and obesity in China. These findings, robust across sensitivity analyses, support the clinical and public health value of tirzepatide in this high-risk population.

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0592

IMPACT OF TRANSITIONING TO ONLINE CPAP MANAGEMENT ON ADHERENCE: REAL-WORLD DATA FROM A REMOTE MONITORING-INTEGRATED CARE MODEL

Kei Nakamura¹, Takumi Kinjyo¹, Kazuyo Tohyama¹, Kunitoshi Iseki¹, Chiho Iseki¹, Chikashi Takara¹, Yoshikazu Takaesu², Hiroshi Nakamura¹

¹Nakamura Clinic, ²Graduate School of Medicine, University of the Ryukyus

Introduction: In Japan, continuous positive airway pressure (CPAP) users have traditionally been required to attend periodic in-person visits for reimbursement. Since 2018, remote monitoring systems that collect cloud-based adherence data have been reimbursed. In 2024, real-time online video consultations for CPAP management also became reimbursed, but their uptake remains limited due to concerns about reduced adherence. Evidence combining online consultations with remote monitoring in Japan is extremely scarce. We therefore conducted a pilot study to evaluate whether transitioning to an online-based follow-up model affects adherence in patients who originally demonstrated stable CPAP use.

Methods: We retrospectively analyzed adult CPAP users at a single sleep clinic who received alternating in-person and online follow-up every three months. The index date was defined as initiation of

online follow-up. Collected variables included age, sex, BMI, AHI by PSG, CPAP usage duration, and residual AHI. Adherence during the three-month period before and after online initiation was compared. Co-primary outcomes were (1) percentage of nights with ≥ 4 hours of use and (2) mean daily usage time (hours). Exploratory non-inferiority analyses were performed with margins of -10 percentage points for ≥ 4 -hour use and -0.5 hours for mean daily usage.

Results: Twenty-eight patients (mean age 50.2 ± 11.8 years; 24 men; mean BMI 29.2 ± 5.9 kg/m²; AHI by PSG 2.2 ± 26.7 events/h) were included. CPAP had been used for a mean of 5.1 ± 5.4 years. Baseline adherence was high (pre-online ≥ 4 -hour use $81.5 \pm 20.1\%$; mean daily usage 5.65 ± 1.14 h). After the introduction of online follow-up, no significant decline in adherence was observed: ≥ 4 -hour use $83.0 \pm 18.2\%$ ($p=0.30$ vs pre) and mean daily usage 5.73 ± 1.12 h ($p=0.36$). Residual AHI remained low and stable (2.04 ± 1.53 vs 2.07 ± 1.55 events/h; $p=0.77$). The 95% confidence intervals for the pre-post differences did not cross the non-inferiority margins, suggesting maintained adherence in this pilot cohort.

Conclusion: In this single-center pilot study, a hybrid model combining online consultations with remote CPAP monitoring did not reduce adherence among patients with initially good usage patterns. This approach may reduce patient travel burden and help reallocate clinical resources toward patients with poor adherence. Larger multicenter studies are warranted to confirm these findings.

Support (if any):

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0593

IMPACT OF THE MYCHART SLEEP CARE PLAN ON CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) ADHERENCE: A PILOT STUDY

Hnin Oo¹, Peer Fish¹, Nidhi Jain¹, Pruthwi Addanki¹, Chia-Ling Kuo¹, Kelin Zhong², Jennifer Langstengel¹, Ethan Bernstein¹, Adrian Salmon¹

¹UConn Health, ²University of Connecticut

Introduction: Adherence to continuous positive airway pressure (CPAP), the gold-standard treatment for obstructive sleep apnea (OSA), often remains suboptimal. The "Epic MyChart Sleep Care Plan" is a novel, Electronic Medical Record (EMR) integrated tool, developed by the research team with EMR support, designed to provide centralized education, device- and mask-specific guidance, reminders, and patient-reported sleep quality questionnaires with automated feedback. This pilot study evaluates whether use of this tool is associated with improved CPAP adherence.

Methods: An initial feasibility study informed improvements to the MyChart Sleep Care Plan, which remained available for eligible patients to enroll via the patient portal throughout the study period. Following IRB approval, a retrospective chart review was performed using data from the UConn Health Pulmonary/Sleep Clinic (April 2024–August 2025). Two cohorts were compared: patients enrolled in and using the Sleep Care Plan and a control group of newly diagnosed OSA with CPAP prescription during the same period. A total of 36 patients in the Sleep Care Plan cohort and 245 patients in the control cohort were analyzed after applying predefined exclusion criteria. The primary outcome was 90-day CPAP adherence per Centers for Medicare and Medicaid

Services (CMS) criteria. Group comparisons used Wilcoxon rank-sum tests and Fisher's exact tests for continuous and categorical variables respectively. Factors associated with adherence were similarly assessed. Statistical significance was set at $p < 0.05$, and analyses were performed in R version 4.5.1.

Results: The overall cohort had a median age of 55 years (IQR 43–66), was 52.3% male, and had a median BMI of 32.5 kg/m² (IQR 28.5–37.9). The Sleep Care Plan group was younger (median 49 vs 56 years) and had fewer males (41.7% vs 53.9%) than controls, although differences were not statistically significant. CPAP adherence was higher in the Sleep Care Plan group compared with controls (83.3% vs 66.5%), approaching but not reaching statistical significance ($p = 0.053$). Adherent patients overall tended to be older, more likely non-Hispanic White and more likely insured through Medicare/Medicaid.

Conclusion: Use of the "MyChart Sleep Care Plan" may improve CPAP adherence. Larger, prospective studies are needed to confirm this finding.

Support (if any): None

Abstract citation ID: zsag091.0593

0594

MANDIBULAR ADVANCEMENT DEVICE VS CONTINUOUS POSITIVE AIRWAY PRESSURE IN OBSTRUCTIVE SLEEP APNEA: AN UPDATED SYSTEMATIC REVIEW AND META-ANALYSIS

Lorena Murrieta Bruciaga¹, Alejandro Chen Liang², Yeison Cruz Castillo³, Italibi M. Sibilla Chacon⁴, Salma A. Beltran Covarrubias⁵, Arnold Ocoró-Vallecilla⁶, Ernesto Calderón Martínez⁷

¹Universidad del Valle de México Campus Hermosillo, ²Centro de Estudios Universitarios Xochicalco Campus Tijuana,

³Universidad Autónoma de Santo Domingo, ⁴Universidad Autónoma de Guadalajara Campus Tabasco, ⁵Universidad de Guadalajara, ⁶Mount Sinai Medical Center Florida, ⁷University of Texas Health Science Center Department of Internal Medicine

Introduction: Obstructive sleep apnea (OSA) is a common sleep-related breathing disorder that increases the risk of cardiovascular diseases. While continuous positive airway pressure (CPAP) remains in first-line therapy for OSA, poor adherence continues to be a concern. Recently, mandibular advancement devices (MADs) have emerged as a safe and effective alternative. This systematic review and meta-analysis aim to compare MAD and CPAP across several health outcomes.

Methods: Following PRISMA guidelines, six databases were searched, and the protocol was preregistered on PROSPERO (CRD420251081182). Primary outcomes include apnea-hypopnea index (AHI), peripheral capillary oxygen saturation (SpO₂), and several blood pressure (BP) parameters. Secondary outcomes include adherence, oxygen-desaturation index (ODI), among others. A meta-analysis was performed using R version 4.4.3 and heterogeneity was assessed using I² statistics.

Results: A total of 17 studies were included with 1,498 observations. The CPAP group showed a significant reduction in AHI (MD = 8.68, 95% CI: 4.66 to 12.71; $p < 0.01$) and improvement in SpO₂ (MD = -5.06, 95% CI: -6.32 to -3.81; $p < 0.01$). The MAD group showed a meaningful improvement in adherence (MD = 1.55, 95% CI: 0.95

to 2.16; $p < 0.01$) and modest significant reduction in several BP parameters.

Conclusion: This review demonstrates that MAD may improve cardiovascular outcomes and offers better adherence, making it a practical alternative for patients unable to tolerate CPAP. CPAP remains superior for sleep parameters and OSA symptom relief. MAD appears safe and effective, supporting further long-term trials to assess cardiovascular outcomes.

Support (if any):

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0595

PERIODIC LIMB MOVEMENTS DO NOT PREDICT CPAP ADHERENCE: THE ROLE OF SLEEP FRAGMENTATION AND DISEASE SEVERITY

Emanuel Salcedo¹, Alec M. Chan-Golston², Daniel Picchetti³, Lourdes DelRosso⁴

¹Valley Health Team Family Medicine Residency, ²UC Merced,

³Carle Health, ⁴University of California San Francisco, Fresno

Introduction: Periodic limb movements during sleep (PLMS) frequently co-occur with obstructive sleep apnea (OSA), yet their impact on continuous positive airway pressure (CPAP) adherence remains unclear. This study examined whether elevated periodic limb movement index (PLMI ≥ 15 /h) predicts CPAP adherence and assessed associated differences in sleep architecture.

Methods: We retrospectively analyzed 150 adults with OSA who underwent diagnostic polysomnography and had 90-day objective CPAP adherence data. Participants were categorized into elevated PLMI (≥ 15 /h; $n=72$) and normal PLMI (< 15 /h; $n=78$) groups. Sleep architecture, arousal index, and CPAP adherence metrics were compared. Multivariable regression models adjusted for age, sex, race, apnea-hypopnea index (AHI), and arousal index.

Results: Patients with elevated PLMI were older (63.4 ± 15.8 vs. 57.5 ± 17.5 years; $p=0.01$) and had significantly more sleep fragmentation. Compared with the normal PLMI group, they demonstrated reduced N3 sleep ($6.6\% \pm 6.9\%$ vs. $9.6\% \pm 7.3\%$; $p=0.004$), reduced REM sleep ($8.9\% \pm 7.3\%$ vs. $12.3\% \pm 8.3\%$; $p=0.01$), less N2 sleep ($41.1\% \pm 18.9\%$ vs. $47.4\% \pm 14.9\%$; $p=0.04$), more N1 sleep ($7.5\% \pm 5.6\%$ vs. $5.7\% \pm 4.1\%$; $p=0.03$), and a markedly higher arousal index (20.6 ± 26.2 vs. 10.2 ± 10.3 ; $p=0.01$). CPAP adherence did not differ between PLMI groups. Elevated PLMI was not associated with percentage of days CPAP was used ($\beta = -3.08$; $p=0.25$), percentage of days ≥ 4 hours ($\beta = -4.61$; $p=0.18$), average nightly hours ($\beta = -0.40$; $p=0.18$), or hours used on days CPAP was worn ($\beta = -0.92$; $p=0.06$). Independent predictors of better adherence included male sex ($\beta = +6.55\%$ total days used, $p=0.03$; $\beta = +1.01$ nightly hours, $p=0.003$) and higher AHI, which predicted longer use on days CPAP was worn ($\beta = +0.05$ hours per AHI unit; $p < 0.001$). A higher arousal index predicted shorter nightly use ($\beta = -0.06$ hours; $p=0.03$). Greater N3 sleep predicted increased nightly use ($\beta = +0.07$ hours; $p=0.01$).

Conclusion: Although elevated PLMI is associated with significantly disrupted sleep architecture and higher arousal burden, it does not independently predict CPAP non-adherence. Instead, sex, OSA severity, and sleep fragmentation metrics exert stronger influence.

Support (if any):

Abstract citation ID: zstag091.0595

0596

PRESSURE SUPPORT DOES NOT LEAD TO INCREASED TREATMENT ADHERENCE VERSUS CPAP: A SYSTEMATIC REVIEW AND META-ANALYSIS

Ludovico Messineo¹, Jessie Bakker², William Noah³, David White¹¹Harvard Medical School, ²Independent Consultant, ³Sleep Centers of Middle Tennessee

Introduction: Modified continuous positive airway pressure (CPAP) modalities providing pressure support—bilevel PAP (BPAP) or expiratory pressure relief algorithms (EPRAs)—are routinely used for OSA treatment, despite little evidence of increased adherence and improved downstream outcomes. Therefore, we sought an answer to the following question: Does the use of pressure support increase treatment adherence in OSA patients? To answer this question, an updated, more comprehensive systematic review and meta-analysis of pressure support on adherence is needed.

Methods: MEDLINE, EMBASE, CENTRAL, Clinicaltrials.gov and major abstract repositories were searched for randomized and non-randomized control trials assessing the effect of pressure support (BPAP, EPRA or both) on adherence (primary outcome) vs. CPAP in adults with OSA and in those exhibiting CPAP intolerance (exploratory). Subgroup analyses and meta-regressions assessed potential causes of heterogeneity. Epworth Sleepiness Scale (ESS) changes from baseline, residual apnea-hypopnea index (AHI) and leak (secondary outcomes) were also analyzed when available. GRADE was used for certainty of evidence (CoE) rating.

Results: In twenty-one studies (N=1462 participants), pressure support did not affect adherence vs. CPAP (mean difference [95%CI]: 0.21 [-0.01, 0.44] h/night, P=0.06; heterogeneity=45%; CoE: very-low-to-moderate). BPAP had a larger effect amongst those exhibiting PAP intolerance (0.68 [0.14, 1.23] h/night, P=0.01), but CoE was very-low. Longer follow-up duration was associated with decreasing adherence to pressure support vs. CPAP (-0.18 [-0.36, -0.03] h/night per additional trimester beyond 3 months, P=0.03). There was no difference in ESS and residual AHI between interventions, but leak was reduced on pressure support (CoE: low-to-moderate).

Conclusion: Pressure support yields similar adherence and residual AHI to CPAP. Given increased research and development demands and device cost, its use in OSA cannot be recommended.

Support (if any): None

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0597

RELATIONSHIP DURATION AS A PREDICTOR OF CPAP ADHERENCE AND PSYCHOSOCIAL BENEFIT IN OBSTRUCTIVE SLEEP APNEA

Summer Ghamedi¹, Leanne Kaye², Kimberly Sterling², Elroy Boers¹¹Resmed, ²Resmed Science Center

Introduction: Obstructive sleep apnea (OSA) can be effectively managed with continuous positive airway pressure (CPAP) therapy. However, adherence and psychosocial outcomes can vary widely between patients. Relationship factors are increasingly recognized as important for treatment success, but the role of relationship duration on CPAP adherence and relational outcomes has not been systematically assessed. We conducted a structured narrative review to evaluate the association of relationship

duration with adherence and psychosocial benefit among couples affected by OSA.

Methods: We reviewed qualitative, observational, and randomized studies published through August 2025 that reported on relationship outcomes in adults with OSA using CPAP and their partners. 26 studies (N = 3384 participants) met the inclusion criteria and were stratified by apnea hypopnea index (AHI: mild, moderate, severe OSA), CPAP adherence (≥ 4 h/night on $\geq 70\%$ of nights) and relationship duration (early-term ≤ 10 years, mid-term 11-20 years, long-term > 20 years). Qualitative outcomes were coded for relationship satisfaction, emotional wellbeing, and sexual health, and synthesized in a structured narrative review.

Results: Across 26 studies, PAP users in long-term relationships exhibited the highest adherence, with 75% meeting adherence criteria, compared to 55% of PAP users in mid-term relationships and less than 50% of PAP users in early-term relationships. Couples in long-term relationships also demonstrated the greatest improvements in relationship satisfaction, communication, and sexual intimacy. Partner engagement, perceived mutual benefit, and baseline relationship quality were found to be the best predictors of adherence.

Conclusion: Relationship duration appears to be an important determinant of CPAP adherence and psychosocial benefits in OSA. Patients in long-term relationships are more likely to adopt and persist with therapy than those in earlier stages of their relationship. Couples in long-term relationships also show superior relational benefits compared with those in shorter relationships. These findings suggest that relational stability acts as both facilitator of adherence and magnifier of treatment benefit. Behavioral interventions may benefit from tailoring adherence strategies to relationship stage, by integrating partner education and dyadic coping frameworks into sleep apnea management, particularly for couples with shorter relationship duration.

Support (if any): Resmed

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0598

A RETROSPECTIVE COMPARISON OF CONTINUOUS POSITIVE AIRWAY PRESSURE AND PHRENIC NERVE STIMULATION IN THE TREATMENT OF CENTRAL SLEEP APNEA

Stephan Reyes¹, Steven Holfinger², Demond Handley², Meena Khan²¹The Ohio State University Wexner Medical Center, ²The Ohio State University

Introduction: Treatment of central sleep apnea (CSA) has mainly been positive airway pressure (PAP). In 2017, the US Food and Drug Administration approved a transvenous phrenic nerve stimulation (TPNS) device for the treatment of moderate to severe CSA. We conducted a retrospective study comparing one-year outcomes in patients with moderate to severe central sleep apnea who were prescribed PAP vs TPNS.

Methods: We assessed one year outcomes of patients with CSA initiating treatment with either PAP or TPNS between Feb 1, 2018 to December 31, 2023 at our institution. We evaluated reduction in apnea hypopnea index (AHI), oxygen desaturation index (ODI), Epworth sleepiness scale (ESS), functional outcomes of sleep questionnaire (FOSQ), and adherence. Patient demographic and clinical characteristics were summarized using descriptive statistics, Wilcoxon rank-sum tests were used to analyze continuous

variables, and Fisher's exact tests were used to analyze categorical variables.

Results: We analyzed 45 patients, with 48.9% (22) receiving PAP and 51.1% (23) receiving TPNS. The median age was 72 years. The patients were mainly male (75.6%) and white (88.9%). At one-year, both groups had a statistically significant decrease in AHI and ODI. The TPNS group had a significant decrease in CAI and ESS. CAI at one year could not be obtained from PAP group as it was based on PAP downloads. The TPNS group did have a significantly higher treatment AHI compared to PAP group (PAP 40.5 to 3.80 vs. TPNS: 40.2 to 18.00). There was no significant difference between ESS, FOSQ, and adherence rates between the two groups at one year.

Conclusion: This study suggests that TPNS is similar to PAP for treating patients with moderate to severe CSA in terms of reducing symptom burden. Limitations include retrospective nature, low sample size, and missing data. A higher treatment AHI in the TPNS group is expected as PAP can treat obstructive and central sleep apnea while TPNS can only treat central events. Despite this, overall AHI and CAI were significantly reduced in the TPNS group, similar to other studies. For those with moderate to severe central sleep apnea, TPNS is an effective treatment option.

Support (if any):

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0599

CULTURAL ADAPTATION OF A DYADIC DIGITAL HEALTH TREATMENT TO IMPROVE POSITIVE AIRWAY PRESSURE ADHERENCE AND SLEEP HEALTH AMONG HISPANIC COUPLES

Carmela Alcantara¹, Sofia Vallejo-Riveros², Bobbie Bermudez Bonilla², Yeny Arones², Sara Carbajal-Salisbury³, Ivette Lopez², Kelly Baron², Wendy Troxel⁴

¹Columbia University School of Social Work, ²University of Utah,

³Alliance Community Services, ⁴RAND Corporation

Introduction: While the gold-standard treatment for OSA is positive airway pressure (PAP), most patients are non-adherent. Current PAP adherence treatments were designed with a focus on the individual and on non-Hispanic White populations, overlooking the role of the bedpartner in treatment, and salient sociocultural factors that may shape treatment adherence in marginalized groups. Our aim was to describe the rigorous cultural adaptation process we used to develop "Nuestro Sueño," a culturally adapted, evidence-based, 3 session dyadic digital health treatment to improve PAP adherence and sleep health among Hispanic patients and their bedpartners.

Methods: We used an integrated four-stage model of cultural adaptation to guide our process. A bilingual (Spanish/English) community advisory board provided critical input. In stages 1-3, six focus groups with 15 couples, and 6 dyadic interviews were conducted to obtain feedback. In stage 4, a pilot study was conducted with 4 couples. To organize and report our findings, we used the cultural adaptation taxonomy of common elements.

Results: Participants were 54 adults (Mean=51.4 [SD=11.3], 52% female, 74% Spanish-language preference, 33% Mexican, 30% Peruvian, 17% US-born, 20% Other). Relationship duration was 22.3 years (SD=14.22). Average PAP use was 3.85 years (SD=3.4). Cultural adaptations to the original intervention were made in each of the taxonomy components (81 total). Deep-level adaptations (52% of the changes based on sociocultural values) included

integration of cultural values of familismo and marianismo into treatment, inclusion of Spanish language proverbs, and language tailoring to address health literacy concerns. Surface-level adaptations (48% of the changes based on observable characteristics) included structural changes to the treatment such as use of ethnicity-matched community health workers as interventionists, Spanish-language translation, use of culturally and age-appropriate images, and integrating health information relevant to the target population.

Conclusion: We used a rigorous cultural adaptation process to develop an innovative, culturally acceptable dyadic digital health treatment that leverages the central role of family in health promotion. Future research should evaluate the effectiveness of Nuestro Sueño in improving PAP adherence and sleep health among Hispanic couples.

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0600

IDENTIFYING RESPONDERS TO MANDIBULAR ADVANCEMENT DEVICES IN ADVANCE: A SUBGROUP ANALYSIS IN PROSOMNUS DEVICES

Daniel Vena¹, Sara op de beeck², Reza Radmand¹, Bradley Edwards³, Ali Azarbarzin⁴, Joao Luiz Gomes Carneiro Monteiro¹, Jean-Louis Pepin⁵, Andrew Wellman⁶, Olivier Vanderveken², Scott Sands⁷

¹Brigham and Women's Hospital, ²University of Antwerp,

³Monash University, ⁴Harvard Medical School, ⁵University Grenoble Alpes, Inserm, CHU Grenoble Alpes, ⁶Harvard, Brigham and Women's Hospital, ⁷Harvard University

Introduction: Obstructive sleep apnea (OSA) is common and harmful, yet difficult to treat. Continuous positive airway pressure is often limited by adherence, while mandibular advancement devices (MAD) are more tolerable but work well only in some patients. Identifying mechanistic subgroups with the greatest likelihood of benefit could enable MAD as first-line therapy in selected individuals. Using pooled data from six studies, we recently developed an endotype-based prediction model. Because response may vary by device, this presentation examines outcomes specifically with Prosomnus devices (a sponsor of FLOSAT and Praxis).

Methods: The ADVANCE consortium (US, Belgium, Australia, France) pooled individual patient data from six MAD studies (PROMAD, OASSC, UGAMAD, MADOX, FLOSAT, Praxis) comprising 281 patients with baseline apnea-hypopnea index (AHI) > 10 events/hr. In the parent study, patients in the strong-response endotype—characterized by lower loop gain, higher AHI, younger age, lower BMI, and greater sleep depth—exhibited a 62 [54, 69] %reduction in AHI (N=55), stronger than the 37 [26, 48] %reduction (P=0.001) seen in the remaining patients (moderate-response endotype, N=35). Here we reassessed outcomes by subgroup in patients using Prosomnus devices. Results were presented for all patients (N=119, development+validation), and the validation subset (N=58; 33% of FLOSAT; plus Praxis, collected prospectively for validation). Linear regression compared the %reduction in AHI between groups. The primary test was the subgroup difference in the validation sample.

Results: Participant characteristics: 94M:25F, median[IQR] age=54[44-62] years, BMI=28[26-31] kg/m², AHI=25[18-34] events/hr. In the overall sample, patients in the strong-response endotype (N=64) exhibited a 70% [64, 75] reduction in AHI, which

was stronger than the 53% [46, 59] reduction in the moderate-response endotype (N=55). In validation: the strong-response endotype (N=29) exhibited a 68% [58, 76] reduction in AHI, which was stronger than 51% [39, 62] in the moderate-response endotype (N=29). The therapeutic difference was 17% [92.3, 31] (P=0.026), exceeding the minimal clinically-important difference (15%).

Conclusion: The strong-response endotype subgroup—characterized by lower loop gain, higher AHI, younger age, lower BMI, and greater sleep depth—achieved profound OSA improvements with Prosomnus MAD devices, knowledge which may facilitate a precision model of care employing MAD as a first-line intervention in selected patients.

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0601

LONGITUDINAL ANALYSIS OF FDA MAUDE REPORTS FOR ORAL APPLIANCES: RECENT SHIFT IN ADVERSE EVENT PROFILES (2020–2025)

Sue Richardson¹, Aaron Glick²

¹Houston Sleep Well, ²University of Texas Health Science Center at Houston

Introduction: The US Food and Drug Administration (FDA) monitors post-market safety of oral appliances for the indication of treating obstructive sleep apnea and snoring under product codes LRK, LQZ, and PLC. Historically, adverse events in this category have been infrequent. Yet, there has been a recent introduction of direct-to-consumer (DTC) models without dentist oversight that has altered device distribution. This study utilizes the Manufacturer and User Facility Device Experience (MAUDE) database to quantify reported trends in both report volume and the nature of device failures associated with non-traditional delivery models.

Methods: A retrospective database analysis was conducted for product codes LRK, LQZ, and PLC from January 2020 through December 2025. Adverse events were categorized into primary failure modes through a manual review of narrative information. Data was stratified by year and 11 event type categories (e.g., allergy, broken device, bite change). Two time cohorts were defined: Period A (2020–2023) and Period B (2024–2025). Chi-square test of independence was performed to evaluate the relationship between the time period and the distribution of adverse event categories.

Results: A total of 835 reports were identified for code LRK, while codes LQZ and PLC showed negligible activity ($n < 5$). The mean annual report volume was 41.5 in Period A and 333.5 in Period B. Furthermore, the safety profile demonstrated a fundamental shift. In Period A, allergy was the primary adverse event (74.8% of complaints), with broken device category comprising 8.5%. In Period B, this distribution inverted significantly (Chi-squared test, $p < 0.0001$): broken device reports rose to 92.3% of classified, while allergy reports decreased proportionately. One type of device accounted for 97.6% ($n = 651$) of Period B complaints.

Conclusion: The years 2024–2025 exhibit a statistically significant discontinuity in FDA MAUDE reporting for oral appliance therapy, with one device overrepresented. The data indicates not only an 8-fold increase in report volume but also a fundamental change in failure mode—shifting from biocompatibility issues (allergies) to mechanical integrity failures (device fracture). Further research

should investigate the distinct change of high-volume mechanical failure and if this is attributable to the DTC model due to current remote fabrication and delivery processes.

Support (if any):

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0602

PERSONALIZED CPAP ADHERENCE WITH SLEEPWELL24: EARLY OUTCOMES OF AN ADAPTIVE SMARTPHONE APPLICATION USING CONTROL SYSTEMS ENGINEERING APPROACHES

Megan Petrov¹, Owais Khan¹, Daniel Rivera¹, Matthew Buman¹, Timothy Morgenthaler², Umesh Goswami³, Tsung-Yen Yu¹, Harsh Anand¹, Victoria Carlock¹, Chelsea Dorich¹

¹Arizona State University, ²Mayo Clinic, Rochester, ³Mayo Clinic Arizona

Introduction: Adherence to continuous positive airway pressure (CPAP) therapy is difficult for many patients with obstructive sleep apnea. Clinical outcomes are improved with CPAP adherence ≥ 6 hr/night, yet scalable approaches to personalized support are limited. We developed a theory-based, clinic experience-driven conceptual dynamical model for optimizing CPAP use and applied it to a ‘just-in-time’ adaptive version of SleepWell24, a smartphone application integrating near-real-time wearable data, CPAP use, and patient-reported symptoms and CPAP-related problems with evidence-based behavior change interventions. In this feasibility optimization trial, we examined patient acceptability and initial outcomes of the adaptive SleepWell24 platform, and guided by the conceptual model, evaluated a control systems engineering approach to demonstrate, in simulation, improved CPAP adherence.

Methods: Aim 1: Naïve CPAP users (N=10; M age=61.7, 60% female) participated in this 60-day ongoing trial. Patients were encouraged to interact daily with SleepWell24 to report symptoms, receive personalized troubleshooting recommendations, set goals, and receive feedback on CPAP use (via Wi-Fi-enabled smart plug assessing CPAP ‘on/off state’) and sleep/activity (Fitbit). We assessed SleepWell24 use, post-intervention acceptability, and consistent CPAP use defined as ≥ 6 hr, for ≥ 6 nights/week for ≥ 2 consecutive weeks. Aim 2: The conceptual model of CPAP adherence produced a dynamical system, informed by Model Predictive Control (MPC) as a decision-making algorithm to optimize CPAP use to ≥ 6 hr/night by tailoring actionable behavioral recommendations using patient data integrated in real-time.

Results: Aim 1: Across the 60-day trial, average daily SleepWell24 engagement was 72.7%. Median CPAP adherence of ≥ 6 hr/night was 65.8%. All participants (100%) rated SleepWell24 as moderately-to-totally acceptable and would recommend it; perceived helpfulness averaged 7.0 (of 10). Eighty percent achieved consistent CPAP use. Aim 2: In simulation, the MPC framework managed CPAP-associated symptoms (e.g., nasal, anxiety, leak) and adjusted CPAP use goals, improving predicted CPAP adherence and sleep duration and quality.

Conclusion: SleepWell24 was engaging, acceptable, and helpful, with most users reaching optimal CPAP use. We will next estimate dynamical models using data from trial patients, a necessary step towards full automation of SleepWell24.

Support (if any): AASMF #285-SR-22

Abstract citation ID: zsag091.0602

0603

TAVMLR (TOTAL ANTERO-VERTICAL MANDIBULAR-LINGUAL REPOSITIONING) DEVICE: A BREATH-TO-BREATH REAL-TIME DEMAND-BASED OPTIMIZATION OF AIRFLOW IN OSA

Raghavendra Ghuge, Advait Ghuge

Sleep Medicine Institute of TX

Introduction: OSA with multi-level obstructive phenotype limits success of OAT/COAT devices and surgeries (HNS and Hyoid lift). TAVMLR® (Total Antero-Vertical Mandibular-Lingual Repositioning device) delivers incremental airflow with antero-vertical mandibular rotation and optimization of alveolar oxygenation.

Methods: 200 consecutive patients who were diagnosed with OSA with HST, underwent dental scan, AIO AI-predictive flange/plateau customization of AIO Breathe®. The device had single prescription strength, namely, Resting Anterior Position (RAP) of 2mm and Mandibular Plateau (MP1) of 4mm. Flange design customization permitted voluntary mouth opening to guide anterior translation up to 8mm on demand with incremental mandibular rotation up to 13 degrees clinically confirmed at device delivery. Post-treatment HST was performed after 2 weeks. Follow-up at 3M, 6M and 12M with assessment of TMJ and dental movement were performed.

Results: Retrospective comparison (N=200) of Pretreatment DX HST DX-AHI, DX-LSAT, DXHB < 90% (Hypoxic Burden < 90%), treatment RX-AHI, RX-LSAT, RXHB < 90% (Hypoxic Burden < 90%) are detailed below. 1. Severe OSA: N = 60. Mean DX-AHI 41.8, DX-AHI range 30-80, 1 Std. dev. 13.2. Mean DX-LSAT 79.8%, DX-LSAT range 58% - 89%. Mean RX-AHI 2.4, RX-AHI range 0 - 4.8, 1 Std. Dev. of 1.7. Mean RX-LSAT 91.2%, RX-LSAT range 90% - 95%. Mean DXHB < 90% 37% and Mean RXHB < 90% 0.0%. 2. Moderate OSA: N = 100: Mean DX-AHI 22.5, DX-AHI range 15-29.7, 1 Std. dev. was 4.03. Mean DX-LSAT 83.5%, range of LSAT 64% - 89%. Mean RX-AHI 2.0, RX-AHI range 0 - 4.5, 1 Std. Dev. 1.68. Mean RX-LSAT 91.2%, RX-LSAT range 90% - 95%. Mean DXHB < 90% 28%, RXHB < 90% 0.0%. 3. Mild OSA: N = 40: Mean DX-AHI 8.3, DX-AHI range 5-14.9, 1 Std. dev. 4.0. Mean DX-LSAT 86.1%, DX-LSAT range 73% - 90%. Mean RX-AHI 1.1, RX-AHI range 0 - 5, 1 Std. Dev. 1.5. Mean RX-LSAT 93.1%, RX-LSAT range 90% - 98%. Mean DXHB < 90% 21%, RXHB < 90% 0.0%.

Conclusion: Single strength prescription TAVMLR® delivered optimal airflow to meet patient's oxygen demand with residual AHI < 5, LSAT > 90%, HB < 90% 0%. Unique AI-predictive flange/plateau design geometry is a novel approach at breath-to-breath real-time demand-based optimization of airflow, irrespective of OSA severity or phenotype.

Support (if any): AIOMEGA®

Abstract citation ID: zsag091.0603

0604

CO2 REBREATHING THROUGH A NOVEL CONTINUOUS POSITIVE AIRWAY PRESSURE BREATHING CIRCUIT IMPROVES CENTRAL SLEEP APNEA AND CHEYNE-STOKES RESPIRATION

Cristian Zhang¹, Robin Dubois², Jeff Quinn², Diane Nguyen³, Alan Schwartz⁴

¹University of Pennsylvania, ²Periodic Breathing LLC, ³University of Maryland, ⁴University of Pennsylvania, Perelman School of Medicine

Introduction: CSA/CSR have been associated with increased morbidity and mortality. Current non-invasive therapies can mitigate but seldom eliminate CSA/CSR. CSA/CSR often develops in patients with reduced CO2 ventilatory reserve for which exogenous CO2 administration during sleep can increase ventilatory reserve and stabilize CSA/CSR. Nevertheless, treatment with exogenous CO2 is hampered by bulky delivery systems that require CO2 replenishment. We hypothesized that these limitations could be overcome and CSA/CSR could be treated if rebreathed their own CO2 from a novel positive airway pressure (PAP) breathing circuit.

Methods: Eight men with predominantly CSA/CSR from heart failure (N=7) and traumatic brain injury (N=1) were recruited (age, 72.3±10.0yr; BMI, 31.2±7.0kg/m²; mean±SD) for an abbreviated polysomnogram (PSG) on low-level CPAP. A novel CPAP breathing circuit was designed to accumulate expired CO2 by limiting CO2 washout through a servo-controlled exhalation valve. Leak flow was toggled every ~10 minutes during non-REM sleep to alternate between CO2 rebreathing and room air. Effects of leak flow on CO2 rebreathing and sleep disordered breathing outcomes (apnea-hypopnea index: AHI_{4%}; respiratory disturbance index: RDI; %CSR; End-tidal CO2: ET_{CO2}) were examined.

Results: Baseline sleep parameters showed a median AHI_{4%} of 37±17.8/hr with central AHI of 15.3±7.1/hr, and CSR% of 44±16.8% of total sleep time (TST). The mean nocturnal SpO₂ was 93.6±1.9% with time spent below 90% of 6.1±8.3% and mean nadir of 80.1±4%. TST was 87.2±25min on room air and was 32.4±24.2min on CO2 rebreathing. CO2 rebreathing increased ET_{CO2} (40.5±2.9 vs. 35.9±1.8mmHg) by reducing leak flow (22.2±2.4 vs. 7.9±0.6LPM), and was associated with reductions in AHI_{4%} (27.0±14.6 vs. 6.1±7.3/hr) and RDI (38.1±13.4 vs. 11.2±10.0/hr).

Conclusion: CO2 rebreathing through a novel PAP circuit improved CSA/CSR markedly by limiting leak flow, reversing baseline hypocapnia, normalizing ET_{CO2} and increasing CO2 ventilatory reserve. Extended trials are required to determine the safety and efficacy of treatment with this servo-controlled low-level PAP CO2 rebreathing circuit.

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0605

EARLY IDENTIFICATION OF COMMON PAP-ASSOCIATED PROBLEMS: EVALUATION OF THE PAP ISSUE STRATIFICATION TOOL (PIST)

Amy Sawyer¹, Jungwon Min², Rui Yan³, Jessica Yara⁴, Matthew T. Klimper⁴, Jiaxiao Shi³, Alexa Watach¹, Dennis Hwang⁵

¹University of Pennsylvania, ²University of Pennsylvania School of Nursing Department of Family and Community Health, ³Kaiser Permanente, Southern California, Department of Research and Evaluation, ⁴Kaiser Permanente, Southern California, Sleep Medicine, ⁵Kaiser Permanente, Southern California

Introduction: Treatment-related problems during early positive airway pressure therapy (PAP) create adherence barriers. We evaluated the factor structure of a brief screening tool for common

PAP problems, determined a scoring approach, and assessed predictive validity for non-adherence to support PAP troubleshooting.

Methods: A one-group, prospective observational design at Kaiser Permanente Southern California consecutively enrolled PAP-naïve adults with moderate-severe OSA (AHI4% $\geq$ 15) who accepted PAP (autoCPAP). A PAP Issue Stratification Tool (PIST) survey (content validated by patient and sleep clinician panels) included 32 common PAP issues rated on a 4-point Likert scale for the question, “how much does each issue bother you?” Patients who used PAP $\geq$ 30 minutes on $\geq$ 2 of first 5 days received a survey link on treatment day 5, 10, and 30. Objective PAP use was collected for days 1-90. Exploratory factor analysis (promax) informed domain structure and scoring. PIST total and domain scores were calculated on a 0-100 scale, with higher scores indicating more bothersome issues. Using Day 10 PIST responses, we compared total and domain scores between adherers and non-adherers for usage intervals Days 1-30, 1-90, 61-90 using t-tests (adherence: $\geq$ 4 hours/night on $\geq$ 70% of days).

Results: Of 306 eligible patients, 216 completed Day 10 PIST. Thirteen items had $\geq$ 70% endorsement of “not at all”; four items were removed for low communality or overlapping clinical constructs. Cronbach $r=0.90$. Factor analysis included 27 items with 59% of variance explained by 5 factors: (1) mask-related symptoms and distress, (2) sleep disturbances, (3) psychosocial and practical burdens, (4) device-related challenges, and (5) physiological side effects. For t-tests, 211 participants were included (>2 items incomplete, removed [$n=5$]). PAP adherence rates were: 59% (Days 1-30); 50% (Days 1-90); 46% (Days 61-90). Total PIST score and domain 1 scores were higher for non-adherers at all outcome intervals ($p<.001$). Domain 2 and 4 scores were higher for non-adherers for Days 1-30 and Days 1-90 ($p<.05$). Domain 3 was higher at Day 1-90 ($p<.05$).

Conclusion: The 27-item PIST is a valid screening instrument for identifying clinical PAP issues. Early identification of mask-related symptoms, sleep disturbances, and device-related challenges may inform targeted interventions to improve PAP adherence.

Support (if any):

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0606

EVALUATING THE CLINICAL RELIABILITY OF POSITIVE AIRWAY PRESSURE REPORTED AHI WHEN COMPARED TO CARDIOPULMONARY COUPLING REPORTED AHI ON PAP

Sahil Chopra¹, Savit Malhotra¹, Theresa Do¹, Stacey Gunn¹, Robert Thomas²

¹Empower Sleep, ²Beth Israel Deaconess Medical Center

Introduction: Positive Airway Pressure (PAP) therapy download reports are currently used as the standard of care to assess sleep apnea treatment success. They give insights into usage, leak and residual apnea hypopnea index (AHI-flow). Recent evidence suggests there may be utility in measuring sleep and respiratory health with home sleep testing systems for patients receiving PAP therapy. This study compares residual AHI derived from PAP devices (AHI-flow), and AHI from cardiopulmonary coupling (AHI-cpc) on nights while using PAP therapy. In particular, it examines patients for whom CPAP would have been noted to be effective, and how often more detailed follow-up testing may indicate an ongoing problem.

Methods: As a standard of care, most patients in our clinical program have a home sleep testing system (CardioPulmonary Coupling by Sleep Image) and sleep is tracked across time to mitigate pathology and optimize sleep health. In this cohort we reviewed retrospective remote physiological monitoring (RPM) data from ResMed PAP devices and home sleep testing with cardiopulmonary coupling (CPC) on nights that PAP was utilized, analyzed in multnight longitudinal fashion.

Results: A total of 465 patients met inclusion criteria of same night sleep testing with CPC and PAP use >4 hours on the same night. A total 24,939 nights had matching PAP and CPC data (median 22 nights per participant). The mean AHI-flow from PAP therapy was 2.4 events/hour (median, 1.5 events/hour) and the AHI-cpc was 12.1 events/hour (median, 10.1 events/hour). 22,338 nights had AHI-flow reported to be below 5 events/hr. Amongst nights with PAP-derived AHI-flow < 5 events per hour (what would have been considered treatment success), 85 % of nights had AHI3%-cpc ≥ 5 events per hour, 47.7% of nights had AHI3%-cpc ≥ 10 events per hour, 28.3% nights had ≥ 5 minutes with SpO2 below 90% and 10.6% of nights had ≥ 5 minutes with SpO2 below 88%.

Conclusion: PAP therapy download report may be useful to assess usage and leak, but does have the potential to underestimate residual apnea burden. Relying on a single PAP-based metric to verify treatment efficacy (AHI-flow < 5 /hr) has the potential to miss meaningful residual disease.

Support (if any):

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0607

GRADING THE ADEQUACY OF POSITIVE AIRWAY PRESSURE TITRATIONS DURING OVERNIGHT IN LAB SPLIT NIGHT POLYSOMNOGRAMS

Saiprakash Venkateshiah

Emory University School of Medicine

Introduction: The gold standard test for the diagnosis of Obstructive sleep apnea (OSA) is an overnight in lab polysomnogram (PSG). Split night PSG (first half of the study – diagnostic and the second half is positive airway pressure (PAP) titration to determine optimal PAP pressure is commonly used in clinical practice. American Academy of Sleep Medicine (AASM) has published guidelines grading the adequacy of these PAP titrations as Optimal, Good, Adequate and Unacceptable grades. There is a paucity of literature on the frequency of these AASM PAP titration grades noted in split night polysomnograms.

Methods: Split night PSG reports performed over six months were retrospectively reviewed. Patient's Age, Sex, Body Mass Index, Neck circumference, Epworth Sleeping Scale Scores, Fatigue Severity Scale Scores, number of medical and psychiatric comorbidities, Apnea Hypopnea Index (AHI), Arousal Index and nadir oxygen saturation were collected and analyzed. PAP titrations were graded according to the AASM defined criteria as Optimal, Good, Adequate and Unacceptable titration grades by a board-certified sleep physician.

Results: A total of 284 studies were reviewed, 269 (94.7 %) were men. The age range was 25 to 87 years, median (IQR) 54(45 to 63) years. The mean (SD) Body Mass Index was 35.6(7.2) Kg/m2. The mean (SD) Epworth Sleepiness Scale Score was 13.1(5.2). The Apnea Hypopnea Index was median (IQR) 41.3(24.1 to 70.6) events per hour. The mean (SD) nadir oxygen saturation was 80(8) %.

Titration met the AASM Optimal grade in 89 (31.3 %), Good Grade in 24 (8.4 %), Adequate grade in 113 (39.7%) and Unacceptable grade in 58 (20.4%) studies.

Conclusion: In this series of split-night polysomnograms of predominantly male US Veterans, the most common grade of PAP titration per AASM guidelines noted was Adequate grade, followed by Optimal grade, Unacceptable grade and Good grade respectively. In our series, only 40% of the split-night polysomnograms met the AASM criteria for a “successful titration” (Optimal or Good grade). This adds to the literature informing us on the frequency of AASM PAP titration grades and yield for a successful PAP titration of split-night polysomnograms in clinical practice.

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0608

OBSTRUCTIVE SLEEP APNEA ENDOTYPE ASSOCIATIONS WITH CONTINUOUS POSITIVE AIRWAY PRESSURE ADHERENCE

Megan Duff¹, Raichel Alex¹, Scott Sands², Ali Azarbarzin³, Salma Batool-Anwar¹, Milena Pavlova¹, Lawrence Epstein¹, Susan Redline¹, Brian Cade¹

¹Brigham and Women's Hospital, ²Harvard University, ³Harvard Medical School

Introduction: High continuous positive airway pressure (CPAP) adherence is central to the effective management of obstructive sleep apnea (OSA). However, considerable variability in adherence persists that cannot be explained by known factors such as sleepiness, disease severity, or socio-economic characteristics. Preliminary analyses of endotypic traits as predictors of CPAP adherence have provided conflicting results. To overcome gaps in the literature related to the heterogeneity of data sources and designs, this study uses real-world clinical data to comprehensively analyze OSA endotypes and burdens on CPAP adherence at multiple timescales of compliance.

Methods: Participants consisted of patients at Brigham and Women's Faulkner Hospital with available polysomnography and CPAP adherence data for the first 30 nights (n=1,754) and first year (n=1,527) of use. Endotypes and burdens were calculated from polysomnography recordings using PUPBeta. Adherence was defined as using the device for at least 4 hours on at least 70% of nights. Bivariate logistic regressions were performed between CPAP adherence at both time scales and each endotype/burden metric. An elastic net Cox proportional hazards analysis was performed, including all endotypes and burdens as potential predictors of night to last CPAP use and censoring at one year. Both analyses adjusted for sex, ancestry, BMI, age, and duration between PSG and CPAP dates.

Results: No endotypes/burdens were associated with 30-day adherence. However, each one-unit increase in ventilatory response to arousal (VRA) was associated with a 1.007-fold increased odds (95% CI=1.003-1.012) of one-year CPAP adherence. Increased hazard of stopping CPAP was associated with: (per one-standard deviation increase) lower arousal threshold (HR=0.851; 95% CI=0.752-0.971), and higher loop gain (HR=1.123; 95% CI=1.009-1.354) and circulatory delay (HR=1.088; 95% CI=1.009-1.218).

Conclusion: One-year but not 30-day adherence, as well as CPAP discontinuation rate, were associated with several OSA mechanistic traits. Overall, these findings underscore CPAP adherence associations with OSA mechanistic heterogeneity. The results may help inform risk assessments of patients' likelihood of CPAP therapy adherence based on OSA endotypes and, secondarily, support strategies to improve overall adherence.

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0609

POOR LONG TERM POSITIVE AIRWAY PRESSURE USE IS COMMON AMONG VETERANS AND VARIES BY SITE OF CARE

Grace Pien¹, Sumedha Chhatre², Amy Sawyer¹, Alexa Watach³, Greg Maislin², Brendan Keenan¹, Samuel Kuna²

¹University of Pennsylvania, ²University of Pennsylvania Perelman School of Medicine, ³University of Pennsylvania School of Nursing

Introduction: Many Veterans who are diagnosed with OSA and prescribed positive airway pressure (PAP) therapy struggle to use it. Data on initial and longer term rates of Veteran adherence to PAP are not well described. We examined Veteran adherence to PAP in first and last 90 days of first year, and whether use varied by service location.

Methods: We examined PAP use in 502 patients who underwent diagnostic OSA testing at 7 geographically varied Veteran's Health Administration (VHA) sites to which the Crescenz VAMC provides sleep services, were diagnosed with OSA and initiated treatment with continuous PAP therapy. T-tests were used to compare PAP use metrics between first 90 and last 90 days in the 365 days after PAP initiation. ANOVA was used to compare PAP use metrics among sites.

Results: Mean age was 57.8 (SD 14.2) yrs with 464 (92.4%) males. Patients were mostly White (64.1%) or Black (22.5%). Across all sites, in the first 90 days after devices were in service, mean daily PAP use was 164.0 (SD 163.2) minutes, with mean % days of any PAP use 49.4% (38.1), including 13.2% of patients with use on 0 days. In the last 90 days of the year, mean daily PAP use was 133.9 (118.3) minutes, with mean % days of any PAP use 35.8% (42.5), including 47.0% of Veterans with use on 0 days. Among patients with attempts to use PAP, mean daily use fell from 240.0 (154.7) minutes initially, to 175.5 (188.9) minutes in the last 90 days. Reductions in PAP use metrics were highly significant (all p < 0.0001). Highly significant differences in mean days of use and duration of daily use were observed among sites in both first 90 and last 90 days (all p < 0.0001).

Conclusion: Use of PAP therapy among Veterans across different VHA sites was limited in the first 90 days after PAP initiation, and declined further over the first year after PAP was dispensed. Differences in frequency and duration of PAP use were highly significant among sites, raising questions about how site-specific characteristics and patient characteristics influence PAP adherence.

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0610

RELATIONSHIP BETWEEN BEHAVIORAL ADHERENCE PATTERNS DERIVED FROM ELECTRONIC HEALTH RECORDS AND POSITIVE AIRWAY PRESSURE ADHERENCENathanael Hwang¹, M. Brandon Westover², Diego Mazzotti³, Robert Thomas², Dennis Hwang¹, Jiaxiao Shi⁴, Rui Yan⁴, Kendra Becker¹, Joseph Kim¹, Monika Mathur¹, Jessica Yara⁵, Matthew T. Klimper⁵, Haoqi Sun²¹Kaiser Permanente, Southern California, ²Beth Israel Deaconess Medical Center, ³University of Kansas Medical Center, ⁴Kaiser Permanente, Southern California, Department of Research and Evaluation, ⁵Kaiser Permanente, Southern California, Sleep Medicine

Introduction: Behavioral adherence insights can be derived from Electronic Health Record (EHR). We separately revealed EHR-derived medication adherence was higher in 90-day CPAP adherent versus non-adherent patients but with minimal effect size. In this study, we evaluate whether influenza vaccination rate (flu-shot), encounter no-show rates (no-show) and off-work orders and days (OWO) predict CPAP adherence.

Methods: We identified adult OSA patients with new CPAP initiations in Kaiser Permanente Southern California between 2016 and 2025. Baseline characteristics were compared between CMS-adherents (30-day period with $\geq 70\%$ of days with ≥ 4 hours use during first 90-days) and non-adherents. Flu-shot status, encounter no-shows and OWO were derived from EHR (Epic Systems) and assessed during the one-year period prior to CPAP initiation. Statistical significance was assessed using Chi-Square (flu-shot) and Student's t-tests (no-shows and OWO).

Results: Of 151,170 patients, CMS-adherent patients (45.7%) and non-adherent patients (54.3%) were similar in age (54.2 ± 14.5 vs 52.1 ± 15.2 years) and BMI (35.1 ± 8.1 vs 34.8 ± 8.3 kg/m²). Compared with non-adherents, CMS-adherents were more often male (65.5% vs 61.0%) and White (44.8% vs 34.6%), and less frequently Hispanic (33.1% vs 40.3%) or Black (7.3% vs 9.7%). CMS-adherents had higher AHI4% (32.1 ± 25.8 vs 27.9 ± 24.3) and substantially greater 90-day CPAP use (350.9 ± 105.0 vs 116.2 ± 113.8 min/night). Total encounters were also similar (10.4 ± 11.0 vs 10.7 ± 11.5). Lower no-show rates and higher flu-shot rates were seen in CMS-adherents vs non-adherents, but with very small effect sizes: no-show rate $0.5 \pm 3.3\%$ vs $0.8 \pm 4.1\%$ ($p < 0.0001$); flu-shot rate 57.9 vs 55.6% ($p < 0.0001$). OWO order frequency (0.22 ± 1.09 vs 0.25 ± 1.27 ; $p = 0.65$) and OWO days were similar (3.0 ± 31.4 vs 3.7 ± 96.5 ; $p = 0.81$).

Conclusion: Encounter no-show rates and flu-shot rates showed only very small differences between CMS-adherent vs non-adherent patients, while off-work rates did not differ. These EHR-derived metrics are unlikely to contribute meaningfully towards development of CPAP adherence prediction models.

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0611

A HEAD START: IDENTIFYING FACTORS AFFECTING INITIAL AUTO-ADJUSTING POSITIVE AIRWAY PRESSURE THERAPY COMPLIANCE AND CLINIC FOLLOW-UP FOR OSA TREATMENTRyan Long¹, Joshua Lin², Simon Krakovsky¹, Denise Sharon³¹USC/LA General Medical Center Internal Medicine Residency Program, ²USC Caruso Department of Otolaryngology – Head & Neck Surgery, ³Keck Medical Center of USC, Sleep Disorder Center

Introduction: Automatic-adjusting positive airway pressure therapy (APAP), an increasingly popular OSA treatment, offers greater access to non-invasive treatment with efficacy dependent on device compliance. Characteristics affecting initial-compliance are understudied and could be used to better guide OSA treatment initiation. This study analyzes how these characteristics impact therapy compliance and follow-up.

Methods: ResMed therapy compliance and chart data, including demographic, and subjective OSA markers from USC Keck Medical Center patients diagnosed with OSA on HSAT/PSG started on APAP without an initial titration study were collected from January 2017- December 2025. Preliminary data of 100/3569 patients were included in uni- and multi-variate analysis using R-Studio comparing therapy non-compliant versus compliant patients and those lost to follow-up versus those who were not at initial 30 and 90 days as well as 30 days after first follow-up. Compliance was defined as >4 hours of use at $\geq 70\%$.

Results: Our cohort was predominantly middle-aged (53 ± 15.4), male (59%), white (43%), and English-speaking, with their average BMI, AHI, and ESS being 31.2 ± 7.5 , 24.5 ± 18.8 , and 8.84 ± 5.6 , respectively. A significant proportion had hypertension (49%) and hyperlipidemia (40%). Univariate analysis demonstrated Hispanic patients were significantly less likely to be compliant (OR=5.73 $p=0.036$) than non-Hispanic patients, with no significant difference with gender or age. 30-day compliance was associated with 90-day compliance (OR=55.4, $p < 0.001$). While pre-APAP AHI and post-APAP AHI were not statistically different between genders, the reduction of AHI post-APAP was significantly higher in males than in females (24.4 ± 19.9 vs. 14.6 ± 22.2 , $p=0.042$). Patients lost to follow-up had greater residual-AHI than those who did not (10.60 ± 19.56 vs 2.29 ± 2.46 , $p=0.022$). When controlling demographic and patient characteristics on logistic multivariable regression model, increased maximum pressure is associated with increased overall compliance (OR=1.28, 95% CI 1.04-1.58, $p=0.022$).

Conclusion: These preliminary findings would improve identification of patients who will benefit from APAP. Female and Hispanic patients could represent a more vulnerable population to poor compliance. Those with lower maximum pressures on initial compliance-data could represent people not tolerating

therapeutic pressure levels, at risk of poor compliance and loss to follow-up. These patients could be considered for alternative therapies or prior formal titration study with closer follow-up/outreach, preventing patient attrition.

Support (if any):

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0612

BEHAVIORAL SLEEP EXTENSION PROGRAM AND PAP THERAPY WITH ADHERENCE SUPPORT REDUCED SLEEPINESS AND FATIGUE IN PATIENTS WITH SDB AND INSUFFICIENT SLEEP

M. Safwan Badr¹, Jennifer Martin², Monica Kelly³, Susmita Chowdhuri¹, Samiran Ghosh⁴, Peter Liu⁵, Nishtha Pandya¹, Monica Mungarwadi¹, Maria Fatima¹, Summer Habra¹, Cathy Alessi⁶
¹Wayne State University, ²VA Miami Healthcare System, Geriatric Research, Education and Clinical Center, ³David Geffen School of Medicine, University of California Los Angeles, ⁴University of Texas, Houston, ⁵The Lundquist Institute, ⁶VA Greater Los Angeles

Introduction: Improving outcomes for patients with mild-to-moderate sleep disordered breathing (SDB) remains a clinical challenge. A key limitation of the existing literature is failure to consider the contribution of insufficient sleep. Both SDB and insufficient sleep contribute to daytime sleepiness, although treatment typically focuses only on positive airway pressure (PAP) therapy use. This randomized trial (NCT04279834) evaluated whether a 4-week behavioral sleep time extension (STE) intervention was superior to PAP + a 4-week behavioral adherence program (PAP+BA) in reducing daytime sleepiness and fatigue symptoms among patients with mild to moderate SDB and insufficient sleep.

Methods: Participants were enrolled from 2 accredited sleep disorders centers in Detroit, MI. 129 individuals with an AHI of 5.0-29.9, a diary total sleep time < 7 hours at least 4 nights/week, and evidence of baseline sleepiness were randomized to receive either STE or PAP+BA. The main outcomes were (1) changes in Epworth Sleepiness Scale (ESS) and (2) Fatigue Severity Scale (FSS) total scores at 3-month follow-up (main outcome time point). Mixed effects models were used to test the time (baseline, post-treatment, 3-month follow-up) x treatment group (STE, PAP+BA) interactions. Follow-up analyses were conducted within each treatment group.

Results: At baseline, 129 randomized participants (74 women; mean age = 51.7±12.5 yrs, AHI= 15.5±7.5), had mean (SD) ESS =10.7 (4.1), and mean (SD) FSS = 36.0 (11.6). There were no time x group interactions (*p*'s>.05). For PAP+BA, ESS decreased from baseline to 3-month follow up (mean (SD) change = -2.9 (4.6); *p*<.001), and FSS decreased from baseline to 3-month follow-up (mean (SD) change = -3.1 (10.2); *p*=.014). For STE, ESS decreased from baseline to 3-month follow up (mean (SD) change = -2.4 (5.4); *p*<.001), and FSS decreased significantly from baseline to 3-month follow-up (mean (SD) change = -3.4 (9.8); *p*=.014).

Conclusion: Both STE and PAP+BA led to reductions in sleepiness and fatigue, with no evidence of superiority of one treatment over the other. Clinicians should consider each of these options when determining how best to reduce daytime sleepiness among patients with mild-to-moderate SDB and insufficient sleep.

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0613

HIGHER PATIENT SATISFACTION AND THERAPY ADHERENCE WITH CPAP VS. ACPAP: EXPERIENCE IN PRACTICE

Neeraj Kaplish¹, Ronald Gavidia¹, Mark Adams², Aprille Martin³, Ronald Chervin¹

¹University of Michigan, ²Carelinc, ³Binsons

Introduction: Positive airway pressure (PAP) is the standard for treating obstructive sleep apnea (OSA). However, clinical practice varies regarding initiation strategies: sleep-lab titration followed by fixed continuous PAP (CPAP) vs. auto-CPAP. These secondary analyses expand earlier work examining associations between PAP modality, patient therapy satisfaction (PTS), and initial PAP adherence.

Methods: This cross-sectional study examined initial adherence/therapy data from two Southeast Michigan durable medical equipment companies for new PAP users (ages ≥ 18) treated for OSA between 01/2022-12/2022. Logistic regression adjusted for age, gender, body mass index (BMI), health insurance, diagnostic testing, median and 95th percentile pressures, diagnostic apnea-hypopnea index (AHI), and propensity scores (calculated using all mentioned variables except pressures settings) was used to examine associations between PAP modality, and PTS (first-month care check-in) and PAP adherence (usage ≥4h for ≥70% of 30 days). Similarly-adjusted linear regression with propensity weighting was used to examine associations between PAP modality and total days PAP used, percent days PAP used ≥4h, and average usage hours (total days, days used, and total hours).

Results: Among 482 subjects, 50.4% were female. Mean age was 51.9±15.8 years. Median BMI was 33.8±9.0 kg/m². Compared to auto-CPAP (n=281), CPAP users (n=201) were older (53.6±16.3 vs. 50.6±15.3 years), diagnosed mostly via in-lab polysomnography (70.6% vs. 56.6%), had higher AHI (median 18.0±27.0 vs 11.4±14.1), median leaks (3.2±7.5 vs 1.5±4.6 L/min), and median pressure (9.5±3.4 vs. 7.5±2.1 cmH₂O, each *p*< 0.05). The PTS among CPAP users was 80.1% vs. 67.7% (*p*=0.02). Adjusted analysis showed associations between PAP modality and PTS (OR=2.2, 95% CI [1.2, 4.0, *p*=0.01]), and CPAP adherence (OR=2.1, 95% CI [1.1, 3.9, *p*=0.02]). Adjusted linear regression showed CPAP-treated patients had increased days used (*β*=11.4, 95% CI [3.7, 19.1] days), percent days with ≥4 h (*β*=10.6, 95% CI [1.7, 19.5] %), PAP use hours on total days (*β*=0.7, 95% CI [0.1, 1.4] h), hours on days used (*β*=0.8, 95% CI [0.2, 1.3] h), and total hours (*β*=70.6, 95% CI [9.2, 132.0] h).

Conclusion: This analysis from a quasi-experimental design using real-world data suggests higher patient satisfaction and adherence—by about 120% and 110%, respectively—after titration studies and CPAP use compared with auto-CPAP use.

Support (if any):

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0614

IMPACT OF PHYSIOLOGICAL AND SUBJECTIVE METRICS ON NASAL OBSTRUCTION IN PATIENTS ON POSITIVE AIRWAY PRESSURE THERAPY: A MULTI-VARIABLE ANALYSIS

Ryan Cobb¹, John Lin², Karel Calero³

¹University of South Florida, ²USF Morsani College of Medicine, ³James A. Haley Veterans Affairs Hospital

Introduction: Nasal obstruction may impede Positive Airway Pressure (PAP) therapy adherence in patients with Obstructive Sleep Apnea. The Nasal Obstruction Symptom Evaluation (NOSE) questionnaire may help quantify nasal obstruction, and identifying pre-treatment characteristics that predict high NOSE scores may help improve adherence to PAP therapy. This study aimed to determine which physiological or symptomatic variables independently predict baseline NOSE scores.

Methods: We conducted a retrospective chart review of 110 adult patients initiated on PAP therapy at the James A. Haley Veterans' Hospital. We employed a Multiple Linear Regression (MLR) analysis, using the NOSE score as the dependent variable and Age, Body Mass Index (BMI), baseline Apnea Hypopnea Index (AHI), SpO₂ Nadir, Epworth Sleepiness Scale (ESS), and Insomnia Severity Index (ISI) as independent predictors. Simple Linear Regression (SLR) analyses were also performed for each predictor individually to assess univariate correlations.

Results: The average NOSE score for the cohort was 43.2. The overall MLR model was highly statistically significant ($p = 5.85 \times 10^{-7}$), explaining a moderate portion of the variance in NOSE scores (Adjusted $R^2 = 0.273$). Of the six variables entered into the MLR model, only the ISI was identified as a statistically significant independent predictor of NOSE score ($p = 9.9 \times 10^{-6}$). The other predictors did not meet the significance threshold in the multi-variable model. However, individual SLR analyses confirmed significant univariate correlations between NOSE score and Age ($p = 0.031$, $R^2 = 0.0331$), ESS ($p = 0.000302$, $R^2 = 0.106$), and ISI ($p = 9.15 \times 10^{-9}$, $R^2 = 0.2575$).

Conclusion: Based on the MLR and SLR analyses, ISI is the strongest independent predictor of baseline nasal obstruction (NOSE score). Although other factors show univariate correlations, ISI is the only factor that retains significance when controlling for the confounding effects of the other variables. This suggests a correlation between subjective poor sleep quality and self-reported nasal symptoms. Given that nasal obstruction can reduce PAP adherence, patients presenting with insomnia should be specifically evaluated for nasal obstruction. Screening these patients using the NOSE questionnaire offers a targeted strategy to identify those who could benefit from treatment, which may improve PAP adherence.

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0615

IMPROVING POSITIVE AIRWAY PRESSURE THERAPY COMPLIANCE IN THE MILITARY THROUGH NURSE LED ADHERENCE PROGRAM

Ryan Matheson¹, Matthew Brock², Zahari Tchopov², Jaclyn Faulk¹, Alexandra Ables¹, Amanda Radtke¹, Nolan Carlile¹

¹San Antonio Uniformed Services Health Education Consortium,

²Wilford Hall Ambulatory Surgical Center

Introduction: Positive Airway Pressure (PAP) is the primary therapy for obstructive sleep apnea (OSA), especially in moderate to severe OSA. Proactive outreach, education, and adequate follow-up have been shown to improve adherence in the civilian population but have not been extensively studied in the military where adherence is historically poor. Studies have cited around 20% meeting Medicare adherence standards in military populations. This improvement project implemented a nurse-led PAP adherence program to improve PAP adherence by 10% after 6 months.

Methods: Patients with a new diagnosis of moderate to severe OSA were brought to a group session and given education on OSA diagnosis and PAP therapy, which is typical at our sleep center. For this quality improvement project, our nursing team implemented follow-up with patients one week after the group session to ensure they received their PAP machine and scheduled a one-month follow-up through either an in-person or a telehealth appointment (patient preference) with the nursing team. Follow-up appointments evaluated/treated adherence difficulties and set up 3-month and 6-month interval follow ups.

Results: Demographics and clinical characteristics of the pre-intervention group ($n=40$) were age 33.8 years, 75% male, apnea-hypoxia index 25.4/hr, body mass index (BMI) 31.0 kg/m², Epworth sleepiness score (ESS) 12.6, insomnia severity index (ISI) 16.8, low arousal threshold (LAT) endotype 77.5%, and comorbid insomnia in 62.5%. The post-intervention group ($n=17$) demographics and clinical characteristics were age 35.3 years, 94.1% males, average AHI 46.1/hr, BMI 35.3 kg/m², ESS 11.8, ISI 16.2, LAT endotype 70.6%, and comorbid insomnia 76.5%. The pre-intervention group showed 77.5% ($n=31$) with any PAP usage, and 27.5% ($n=11$) met Medicare adherence requirements over a consecutive 30-day period. To date, the post-intervention group showed 70.6% ($n=13$) with any PAP usage and 29.4% ($n=5$) met Medicare adherence.

Conclusion: Preliminary data showed that the nurse-led intervention adherence program had minimal impact on improving PAP adherence and that overall rates of PAP adherence were poor in our population. Data also showed high rates of hyperarousal states in this population, which could be contributing to poor adherence. Future improvement projects and studies should explore novel approaches to improve PAP adherence among military members with OSA.

Support (if any):

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0616

RELATIONSHIP OF ELECTRONIC HEALTH RECORD DERIVED MEDICATION ADHERENCE TO POSITIVE AIRWAY PRESSURE ADHERENCE

Nathanael Hwang¹, M. Brandon Westover², Diego Mazzotti³, Dennis Hwang¹, Robert Thomas², Jiaxiao Shi⁴, Rui Yan⁴, Kendra Becker¹, Anupamjeet Sekhon¹, Jessica Yara⁵, Matthew T. Klimper⁵, Haoqi Sun²

¹Kaiser Permanente, Southern California, ²Beth Israel Deaconess Medical Center, ³University of Kansas Medical Center, ⁴Kaiser Permanente, Southern California, Department of Research and Evaluation, ⁵Kaiser Permanente, Southern California, Sleep Medicine

Introduction: Medication adherence derived from Electronic Health Record (EHR) for chronic disease conditions may predict positive airway pressure (CPAP) adherence for obstructive sleep apnea (OSA) treatment. We compared CPAP adherence and one-year medication adherence for hypertension and hyperlipidemia medications prior to CPAP initiation.

Methods: We identified two adult OSA cohorts with new CPAP initiations in Kaiser Permanente Southern California between 2016 and 2025 with active prescriptions for hypertension (HTN Cohort) or hyperlipidemia (Chol Cohort) at time of CPAP initiation. Medications were classified using their Generic Product Identifier (GPI). EHR-derived baseline characteristics, medication adherence (proportion of days covered using pill days dispensed up to 365 days prior to CPAP initiation), and 90-day CPAP

adherence were compared between CMS- adherents (30-day period with $\geq 70\%$ of days with ≥ 4 hours use during first 90-days) and non-adherents. Student's t-tests evaluated group differences. Associations between medication adherence and CPAP adherence were evaluated using Pearson correlation coefficients.

Results: In the HTN cohort ($n=73,132$), CMS adherent patients (48.1%) and non-adherent patients (51.9%) were similar in age (60.5 ± 12.3 vs 59.7 ± 13.2 years) and BMI (35.2 ± 7.8 vs 34.8 ± 8.1 kg/m²). Compared with non-adherents, CMS adherents were more often male (59.6% vs 56.4%) and White (41.9% vs 33.8%), and less frequently Hispanic (26.0% vs 33.1%) or Black (7.5% vs 10.7%). CMS adherents had higher AHI4% (33.5 ± 24.6 vs 29.8 ± 23.4) and substantially greater 90-day CPAP use (363.0 ± 109.0 vs 122.0 ± 120.1 min/night). Medication adherence was statistically higher among CMS adherents ($78.8 \pm 31.8\%$ vs $77.5 \pm 31.8\%$; $p < 0.0001$), although the effect size was minimal, and the correlation between medication adherence and CPAP adherence was negligible ($R=0.02$; $p < 0.0001$). In the Chol Cohort ($n=18,104$), CMS adherent and non-adherent patients showed similar demographic and clinical characteristics as the HTN cohort. Medication adherence was again slightly higher in CMS adherents (70.8 ± 35.6 vs $68.5 \pm 36.9\%$), though the effect size and its correlation with CPAP adherence were negligible ($R = 0.03$; $p < 0.0001$).

Conclusion: Although medication adherence was statistically higher in CMS-adherent patients, the effect size was clinically negligible. Medication adherence is unlikely to contribute meaningfully towards development of CPAP adherence prediction models.

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0617

CULTURAL AND GENDER DYNAMICS IN HISPANIC/LATINX COUPLES MANAGING OSA AND PAP THERAPY

Avah Mousavi-Raad¹, Christian Escorcía², Ivette Lopez², Wendy Troxel³, Kelly Baron², Bobbie Bermudez Bonilla², Carmela Alcantara⁴

¹RAND, ²University of Utah, ³RAND Corporation, ⁴Columbia University School of Social Work

Introduction: Obstructive sleep apnea (OSA) and PAP therapy affect not only individuals but also the health, functioning, and sleep of romantic partners. These dynamics may be particularly salient in Hispanic/Latinx families, where core sociocultural values shape how couples perceive illness, engage in treatment, and support one another. Yet little work has examined how Hispanic/Latinx couples experience OSA and PAP use, including cultural and gender dynamics. This study explored how these experiences shape daily life, shared sleep, and relationships.

Methods: We conducted three Spanish-language virtual focus group discussions (FGDs) with Hispanic/Latinx adults with OSA (with and without PAP use) and their partners together. A semi-structured facilitator guide examined: (1) interdependence of sleep within couples managing OSA; (2) collaborative and gendered strategies used to address sleep-related challenges; and (3) perceived barriers and facilitators to PAP use in the context of cultural values. FGDs were audio-recorded, transcribed, and thematically analyzed.

Results: Participants ($N = 18$; 9 male, 9 female; 9 PAP users, 9 non-users; Mage = 54.3 years, SD = 11.3, range = 37–76) consistently described OSA as a shared problem that influenced safety,

mood, sleep quality, and intimacy. Partners, most often women, reported sleep loss, hypervigilance, and anxiety related to their partner's symptoms, as well as taking primary responsibility for reminders, equipment setup, and troubleshooting PAP. Over time, many partners described fatigue and frustration, while some men minimized symptoms or disengaged from care. Gendered expectations were a pervasive theme: women were described as “on top of everything,” carrying caregiving and household responsibilities. Cultural norms such as familismo and marianismo intensified these caregiving loads and shaped decisions about seeking and maintaining treatment. PAP use sometimes disrupted intimacy and self-image but also reduced conflict and improved rest when couples collaborated effectively.

Conclusion: Findings demonstrate that OSA management in Hispanic/Latinx families is a deeply interdependent, dyadic process shaped by sociocultural values and gendered caregiving roles. Culturally responsive, couples-based education and support may enhance PAP adherence while reducing the disproportionate burden placed on women partners, improving sleep health and well-being for both patients and their partners.

Support (if any):

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0618

CAN VENTILATORY BURDEN OR HYPOXIC BURDEN PREDICT IMPROVEMENT IN SHORT-TERM SLEEPINESS IN RESPONSE TO CPAP TREATMENT IN OSA PATIENTS?

Catherine Kenney¹, Sajila Wickramaratne¹, Li Zhou¹, Pavel Boulgakov², Nagharjun Mathi Mariappan¹, Ankit Parekh¹

¹Icahn School of Medicine at Mount Sinai, ²David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Hypoxic burden (HB) and ventilatory burden (VB) were developed as alternatives to AHI in predicting OSA outcomes. The abilities of HB and VB to predict long-term outcomes have been explored extensively, yet each's ability to predict short-term outcomes is unknown.

Methods: This is a secondary analysis of the APPLES study that investigated the neurocognitive effects of CPAP therapy on OSA patients. This analysis explored how HB and VB were associated with short-term sleepiness measures. Sleepiness was measured subjectively with the Epworth Sleepiness Scale (ESS), and objectively with lapses on psychomotor vigilance test (PVT). Using the SpO₂ signal, HB was calculated as the area under the desaturation curve during all desaturation events (sustained $>3\%$ dip in SpO₂). VB represents the proportion of overnight breaths with less than 50% normalized amplitude.

Results: There was a statistically significant decline in both ESS ($x^2 = -2.82, p = <.001$) and PVT ($x^2 = -0.20, p = .005$) in the treated group; the clinical significance of the difference is unknown. Correcting for age, gender, and BMI, HB significantly predicted a decline in ESS ($p < .001$, $R^2 \text{adj} = .285$). After adjusting for baseline ESS, HB was a significant, but weaker, predictor of ESS ($p = .044$, $R^2 \text{adj} = .045$). HB significantly predicted a decrease in PVT ($p = .002$, $R^2 \text{adj} = .0429$). A much weaker association between HB and PVT was found after adjusting for baseline PVT ($p = .099$, $R^2 \text{adj} = .374$). AHI significantly predicted changes in PVT and ESS, but this association disappeared after correcting for baseline measurements. VB wasn't associated with PVT or ESS.

Conclusion: HB weakly predicted both subjective (ESS) and objective (PVT) measures of sleepiness after correcting for covariates and baseline measures. VB was not associated with any changes in sleepiness. Most models had an adjusted $R^2 < 5\%$, indicating that the models were good fits for the data even if the covariates were not significant. Since the clinical significance of the changes in sleepiness is unknown for this study, and the original study didn't find improvements in cognition post-treatment, it is not surprising that VB and HB were poor correlates of change in sleepiness in this dataset. Further studies may want to examine these associations with clinically meaningful changes in sleepiness.

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0619

HYPOXIC BURDEN IN NEGATIVE HOME SLEEP STUDIES: RISK STRATIFICATION AND PREDICTION OF LATER OSA DETECTION

Vikas Jain, Stefen Yang, Grant Bond, Kayden Amador, Sanjana Poonuru

Dream Center for Sleep & Circadian Sciences

Introduction: There is promise in analyzing Hypoxic Burden (HB) to potentially identify high-risk patients even when AHI is below the diagnostic threshold. After analyzing 4,197 patients with multi-night HSAT testing using both 3% and 4% desaturation criteria, patients with night-1 negative results ($sAHI < 5$) were isolated. Subset analysis was performed on available HB data. Prevalence of high-risk HB ($>20\%$ minute/hour) was identified in initially negative patients. Using both desaturation criteria, we assessed HB's predictive value to later detect OSA ($AHI \geq 5$ on subsequent nights).

Methods: After analyzing 4,197 patients with multi-night HSAT testing using both 3% and 4% desaturation criteria, patients with night-1 negative results ($sAHI < 5$) were isolated. Subset analysis was performed on available HB data. Prevalence of high-risk HB ($>20\%$ minute/hour) was identified in initially negative patients. Using both desaturation criteria, we assessed HB's predictive value to later detect OSA ($AHI \geq 5$ on subsequent nights).

Results: Using the 3% criterion, 109 patients had a night-1 negative study ($sAHI < 5$), and none exhibited high-risk hypoxic burden ($HB > 20\%$). Despite this, 56 patients (51.4%) were later diagnosed with OSA ($AHI \geq 5$) on subsequent nights. In contrast, with the 4% criterion, 332 patients tested negative on night 1, of whom 48 (14.5%) showed high-risk HB despite normal AHI, and 99 (29.8%) later demonstrated OSA. The 4% threshold identified a subgroup with elevated HB despite negative AHI. Overall, HB's predictive value varied by desaturation criterion, with higher subsequent OSA detection in the 4% negative group.

Conclusion: Using 4% desaturation criteria, hypoxic burden can identify high-risk patients even when conventional AHI is negative. Among initially negative patients, approximately 15% had $HB > 20\%$, indicating significant nocturnal hypoxemia despite $AHI < 5$. Furthermore, 29.8% of these patients were later diagnosed with OSA, suggesting that HB may help flag individuals who would benefit from repeat testing. Incorporating multi-night HSAT with HB assessment could improve risk stratification and reduce false negatives. These findings support HB as a complementary metric for detecting patients at risk for sleep-disordered breathing and its associated cardiovascular consequences.

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0620

CPAP EFFECTS ON SELF-REPORTED OUTCOMES, ATTENTION, AND ACTIGRAPHY- AND HEART RATE-DERIVED CIRCADIAN METRICS: A RANDOMIZED TRIAL

Pei-Lin Lee¹, Chen Lin², Ming-Tzer Lin³, Yung-Hsuan Chen¹, Su-Mei Wang¹, Chin-Hao Chang¹, Wei-Shiung Yang¹, Chong-Jen Yu¹, Joshua J. Gooley⁴

¹National Taiwan University Hospital, ²National Central University, ³Hsiao Chung-Cheng Hospital, ⁴Duke-NUS Medical School

Introduction: Continuous positive airway pressure (CPAP) improves sleepiness and quality of life, but its cognitive effects remain inconsistent, and its influence on circadian regulation is poorly understood. We examined the effects of CPAP on self-reported outcomes, attention, and circadian patterns derived from both activity/rest cycles and heart-rate (HR) rhythms.

Methods: Adults with obstructive sleep apnea were randomized (1:1) to 12 weeks of CPAP or inactive control. Assessments included self-reported sleepiness (Epworth Sleepiness Scale), anxiety/depression (Hospital Anxiety and Depression Scale), sleep quality (Pittsburgh Sleep Quality Index; Insomnia Severity Index), health-related quality of life domains (Short Form-36), attention (Psychomotor Vigilance Task [PVT]; Digit Symbol Substitution Test [DSST]), and circadian metrics (mesor, amplitude, peak, period) derived from 7-day actigraphy-based rest/active patterns and hourly HR rhythms. CPAP effects were estimated as baseline-adjusted between-group differences controlling for age, sex, body mass index, and apnea-hypopnea index using an intention-to-treat framework, with a completer sensitivity analysis.

Results: Fifty-two participants were randomized and 45 completed follow-up. Compared with control, CPAP improved physical functioning and mental health at week 4. At week 12, CPAP reduced sleepiness, enhanced vitality, improved DSST performance (correct responses), shortened mean reaction time, and advanced circadian peak timing derived from both actigraphy and HR measures. No significant effects were observed for anxiety/depression, sleep quality, PVT lapses or reaction time, or other circadian parameters.

Conclusion: CPAP improved sleepiness, select quality-of-life domains, attention, and specific circadian features, whereas sleep quality and mood symptoms showed no measurable benefit. These findings highlight potential short-term cognitive and circadian responsiveness to CPAP, but their clinical implications require further study.

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0621

CARDIOVASCULAR OUTCOMES AFTER HYPOGLOSSAL NERVE STIMULATION FOR OSA: PRELIMINARY RESULTS FROM THE MET12 STUDY

Nathan Nowalk¹, Ines Neto-Caetano², Lauren Baranowski², Alejandra Lastra², Valerie Press², Tamar Polonsky², Esra Tasali², Phillip LoSavio²

¹University of Pennsylvania, ²University of Chicago

Introduction: Obstructive sleep apnea (OSA) is strongly linked to adverse cardiovascular outcomes including hypertension, hyperlipidemia, arrhythmias, and stroke. Positive airway pressure (PAP) is first-line therapy for moderate-to-severe OSA, but only about 50% of patients are adherent. Hypoglossal nerve stimulation (HNS) is increasingly used for patients intolerant to PAP. We aimed to assess the cardiovascular outcomes after HNS in moderate-to-severe OSA.

Methods: We conducted a single-center, prospective pre-post study of adults undergoing HNS implantation for OSA. Post-operative testing at 3 months required >20 hours/week HNS use for 30 days. Cardiovascular measures included: 24-hour ambulatory blood pressure (BP), lipid profile, serum catecholamines, and resting heart rate (HR) and HR variability captured by a wearable activity monitor (Fitbit). All patients underwent pre- and post-operative home sleep apnea tests and completed Epworth Sleepiness Scale (ESS), Pittsburgh Sleep Quality Index (PSQI), and Functional Outcomes of Sleep Questionnaire-10 (FOSQ-10).

Results: To date, twenty-one participants have undergone HNS implantation, with fourteen completing pre- and post-operative testing. Of those participants completing the testing, most identified as male gender (64%) and white race (85%), with mean age 63 years and mean BMI of 31.7 kg/m². Twelve (86%) participants self-reported hypertension; nine (64%) were prescribed antihypertensive medications; four (29%) specifically were treated with beta-blockers. Seven (50%) participants self-reported hyperlipidemia; six (43%) received statin therapy. On average, the apnea-hypopnea index by 3% criteria (AHI3a) decreased by 36% (38±14.0 pre vs. 26.8±16.5 events/hour post; $p < 0.005$); four out of 14 participants (28.5%) met Sher criteria (>50% reduction and AHI3a < 20). Daytime sleepiness improved by ~51% (ESS score; 8.7±1.5 pre vs. 4.2±0.5 post; $p < 0.005$). Postoperative HNS use averaged 7.8 hours/night. Mean 24-hour BP (systolic, diastolic, mean), nocturnal BP dipping, catecholamines, lipid profile, resting HR and HR variability did not significantly differ following HNS therapy.

Conclusion: Our data to date demonstrates feasibility of characterizing cardiovascular profiles of patients with OSA before and after HNS implantation. Ongoing analyses will provide further clarity and enhance our understanding of these preliminary findings. As the first pilot pre-post study examining cardiovascular outcomes of HNS therapy, this work may help guide future, larger trials.

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0622

CURRENT STATUS ON THE RESULTS OF HYPOGLOSSAL NERVE ELECTRICAL STIMULATION THERAPY FOR CPAP INTOLERANCE AND NON-COMPLIANCE AT MEITETSU HOSPITAL

Seiichi Nakata

Meitetsu Hospital

Introduction: Since HNS became covered by insurance in June 2021 in Japan, over four years have passed. As of July 2025, the total number of HNS implant patients in Japan has reached 104 cases. Among these, the total number of patients treated at

Meitetsu Hospital has reached 31 cases, and the number of completed Fine Tune PSG procedures has risen to 18 cases.

Methods: In the retrospective study, we examined the distribution of age, sex, and BMI among these 18 patients and also investigated changes in AHI and L-SPO₂ before and after surgery.

Results: Fine Tune PSG Completion Cases: 18 Cases Age Distribution: 70s: 13%, 60s: 19%, 50s: 32%, with those aged 50 and above accounting for 64%. The male-to-female ratio was 94% male and 6% female. The mean BMI was 25.5 ± 4.8. AHI decreased significantly from 43.7 ± 14.1 to 14.4 ± 17.4. The Green rate (AHI < 15) reached 89%. ($P < 0.01$) L-SPO₂ significantly improved from 74.8 ± 6.0% to 85.7 ± 8.8%. ($P < 0.001$)

Conclusion: This time, the rate of improvement to an AHI below 15 at Meitetsu Hospital reached 89%. This suggests that even for Japanese patients in Asia with CPAP intolerance or non-compliance, if they are convinced of and desire the surgery despite its risks and disadvantages, it can be considered a treatment worth actively pursuing. Furthermore, given that 64% of patients undergoing surgery were aged 50 or older, this treatment may be particularly suitable for the elderly.

Support (if any):

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0623

EFFECT OF HYPOGLOSSAL NERVE STIMULATION ON HYPOXIC BURDEN AND HEART RATE RESPONSE: PRELIMINARY RESULTS FROM A RANDOMIZED CROSSOVER TRIAL

Allison Lin¹, Rachel Kutler¹, Jesus Lopez-Peña¹, Lisa Schulmeyer¹, Paul Trackey¹, Maria Suurna², Ashutosh Kacker³, Ali Azarbarzin⁴, Sanja Jelic⁵, Marie-Pierre St-Onge⁵, Yi Cai¹

¹Columbia University Vagelos College of Physicians and Surgeons, ²University of Miami Miller School of Medicine, ³Weill Cornell Medicine, ⁴Harvard Medical School, ⁵Columbia University Irving Medical Center

Introduction: The cardiovascular outcomes of hypoglossal nerve stimulation (HGNS) therapy for obstructive sleep apnea (OSA) are unknown. Sleep apnea-specific hypoxic burden (HB) and heart rate response (Δ HR) have been shown to better predict cardiovascular outcomes in OSA compared to apnea-hypopnea index (AHI). We present preliminary results from the first randomized trial to examine the effects of HGNS on HB and Δ HR.

Methods: In our ongoing randomized crossover trial, participants undergo two study phases lasting 2 or 4 weeks each of active HGNS (HGNS-on) and HGNS withdrawal (HGNS-off). All participants have been stabilized on HGNS for >3 months and have met Sher20 surgical success criteria. During the last week of each study phase, home sleep testing is conducted. Primary outcomes are HB and Δ HR. Secondary outcomes include AHI (using a 4% hypopnea criteria) and oxygen desaturation index. HB and Δ HR are calculated per methods previously described by Azarbarzin et al. Data from 9 participants (7 male) were available for the present analyses. Signal analyses were performed in MATLAB (MathWorks). Paired t-tests were used to compare data between phases.

Results: Participants had a mean age of 64.7±5.0 years and BMI 27.3±2.8 kg/m². Compared to HGNS-off, HGNS-on reduced AHI from 27.4±9.6 to 15.2±8.0 events/h ($p < 0.001$) and oxygen desaturation index from 24.4±9.1 to 11.5±7.2 events/h ($p=0.001$). HGNS significantly reduced mean HB from 73.9±51.1 to 31.8±31.6 (%)

min)/h ($p=0.01$). Δ HR decreased from 9.5 ± 4.5 to 7.3 ± 3.9 beat-s/min ($p < 0.01$) and event duration, from 27.4 ± 5.8 to 22.4 ± 6.1 s ($p < 0.01$). There were no significant differences in mean saturation per event ($92\pm 2\%$ during both HGNS-on and HGNS-off, $p=0.56$) or magnitude of desaturation ($3\pm 1\%$ during HGNS-on versus $4\pm 1\%$ during HGNS-off, $p=0.28$) between phases. Total sleep time also did not differ between phases ($p=0.11$).

Conclusion: Preliminary results from an ongoing randomized crossover trial of HGNS patients demonstrate reductions in HB and Δ HR with HGNS. These preliminary findings suggest that HGNS may favorably modify cardiovascular risk profiles in patients with OSA.

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0624

NOVEL AUTOMATIC SOFTWARE-GENERATED CUSTOM CPAP MASK TO OPTIMIZE PATIENT FIT: FINITE ELEMENT ANALYSIS RESULTS

Aaron Glick¹, Alexander Gadin², Sudha Tallavajhula³

¹University of Texas Health Science Center at Houston, ²Rice University, ³UTHealth Houston

Introduction: Poor adherence to CPAP therapy remains a critical challenge in managing Obstructive Sleep Apnea (OSA), often driven by discomfort and poor fit from standardized masks. Mask leaks and pressure points are primary patient complaints. We hypothesized that a fully customized, patient-specific CPAP mask would significantly improve comfort by optimizing fit and pressure distribution. To achieve this, we developed a novel, automated software pipeline to translate 3D facial scans directly into 3D-printable mask designs.

Methods: We developed a software application to import 3D facial scans. The software automatically processes the scan and generates a patient-specific mask interface (CAD file) for 3D printing in a medical-grade flexible polymer. To validate this workflow, we acquired a facial scan then performed a Finite Element Analysis (FEA). The facial scan was modeled as epoxy resin commonly used to simulate soft tissue and the mask was assigned its polymer properties. We simulated a total headgear force of 5N (Newtons) to predict the resulting contact pressure and its distribution.

Results: The software successfully processed the facial scan automatically with a full face design. The FEA simulated a 5N headgear force. The custom masks produced a mean peak contact pressure of 27 kPa. As predicted, pressure was mostly evenly distributed across the seal, with minor, localized increases near the strap anchor points. In contrast, current literature reports a 5N headgear force with a standard mask was found to have peak contact forces of 69kPa with concentrated peak pressures on the zygoma.

Conclusion: An automated software workflow to create patient-specific CPAP masks is a rapid and feasible process. Finite Element Analysis predicts that these custom designs distribute headgear forces more evenly and create lower peak pressure points, especially on the zygoma, compared to standard masks. This suggests a biomechanical mechanism for improved patient comfort. Clinical studies are warranted to confirm this simulation in an OSA

population and if this reduction in contact pressure translates to improved CPAP adherence.

Support (if any): None.

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0625

ASSOCIATIONS OF PHYSICAL ACTIVITY AND HYPOXIC BURDEN WITH PROCESSING SPEED AND REGIONAL TAU DEPOSITION IN OLDER BLACK ADULTS

Joshua Gills¹, Anhiti Dharmapuri², Rachel McCray¹, Purbanka Pahari¹, Dominique Tanner¹, Shreshtha Shah¹, Anthony Briggs³, Mark Bernard³, Elena Valkanova⁴, Korey Kam⁵, Ankit Parekh⁵, Lisa Barnes⁶, Gbenga Ogedegbe¹, Omonigho Bubu¹

¹NYU Grossman School of Medicine, ²NYU Langone Health, ³Department of Neurology, NYU Langone Health, ⁴University of South Florida, ⁵Icahn School of Medicine at Mount Sinai, ⁶Rush University Medical Center

Introduction: Physical activity (PA) is acknowledged for its positive impact on cognitive health. In contrast, obstructive sleep apnea—marked by hypoxic burden—has been linked to cognitive impairments and Alzheimer's disease (AD) pathology. Despite their overall contributions to cognitive health, the effects of PA and hypoxic burden on processing speed and regional AD pathology, specifically tau deposition, remain unclear. To address this gap, we investigated how PA and hypoxic burden relate to processing speed and tau deposition in cognitively normal older Black adults.

Methods: A cross-sectional study of 51 participants (mean age: 63.1 ± 15.8 years) from NYU's Aging Research In Sleep Equity and Dementia Prevention Program. Participants underwent neuropsychological testing, nocturnal polysomnography, clinical evaluation, tau ([18F]MK6240) and $A\beta$ ([18F]FBB) PET scans, and seven days of actigraphy to assess PA. Cognitive tasks measured processing speed via the trails A exam, while hypoxic burden was assessed using T90 or the percentage of sleep duration spent with oxygen saturation below 90%. PA was characterized as daily step count. For tau, data were analyzed from composite regions corresponding to Braak pathological stages I–VI. Multivariable regression tested PA, sleep, PET tau outcomes, cognition relationships, adjusting for age, education, sex, global amyloid burden, and BMI.

Results: Participants were 60.8% female, with obesity common (BMI: 30.7 ± 5.9 kg/m²), an average education level of 14.8 $\pm$ 2.4 and processing speed of 35.7 ± 13.8 seconds. Higher PA was significantly associated with faster processing speed ($\beta = -0.24[-0.534, -0.27]$, $p = 0.031$), decreased hypoxic burden ($\beta = -0.32[-0.62, -0.021]$, $p = 0.036$), and decreased regional tau (Braak 1; $\beta = -0.40$, $p = 0.017$). Increased hypoxic burden was significantly associated with slower processing speed ($\beta = 0.32 [0.03, 0.48]$, $p = 0.030$) and an increase in regional tau (Braak stage 4; $\beta = 0.37[0.001, 0.004]$, $p = 0.039$).

Conclusion: Our findings highlight the significant effects of PA and hypoxic burden on processing speed and regional tau deposition in older Black adults. These results underscore the need for longitudinal studies to further explore whether interventions targeting PA can buffer the adverse cognitive and AD pathological effects of hypoxic burden.

Support (if any):

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0626

DETERMINING THE EFFECT OF PAP ON CARDIOVASCULAR RISK IN THE REAL WORLD: A TARGET TRIAL EMULATION OF THE SAVE TRIAL USING STATE-WIDE MEDICARE CLAIMS

Lakshmi Aparna Penumatsa¹, Xing Song¹, Nancy Stewart², David Gozal³, M. Brandon Westover⁴, Neils Turley⁴, Nathanael Hwang⁵, Dennis Hwang⁵, Luciano Drager⁶, Diego Mazzotti²

¹University of Missouri-Columbia, ²University of Kansas Medical Center, ³Marshall University, ⁴Beth Israel Deaconess Medical Center, ⁵Kaiser Permanente, Southern California, ⁶Instituto do Coração

Introduction: Positive Airway Pressure (PAP) is the treatment of choice for severe or symptomatic obstructive sleep apnea (OSA). However, randomized controlled trials (RCTs) failed to demonstrate that PAP prevents major adverse cardiovascular events (MACE). Conversely, observational studies showed significant effects. It is unclear whether differences are due to design considerations or patient selection. We proposed a target trial emulation (TTE) of the Sleep Apnea Cardiovascular Endpoints (SAVE) study, the largest RCT assessing the effect of PAP on MACE risk. We hypothesize that a SAVE trial emulation using observational data would result in a non-significant effect.

Methods: We used the TTE framework to formalize the analysis of state-wide Medicare claims across nine states in the Central U.S. from 2011-2020 towards addressing the question proposed by the SAVE trial. We explicitly described all components of our target trial and operationalized them using observational claims data, making any necessary adjustments. Evidence of PAP initiation was based on claims and MACE was defined as a composite of myocardial infarction, heart failure, stroke, or coronary revascularization. We used prescription time distribution matching to assign index dates and propensity score matching to control for confounding using baseline covariates when assessing causal contrasts. Cox proportional hazards models estimated treatment effect sizes.

Results: After applying the SAVE eligibility criteria, 168,415 beneficiaries were included (mean [SD] age 75.1 [6.3] years; 40% women), and 22,372 (13.3%) had evidence of initiating PAP. Our estimated intention-to-treat effect (hazard ratio [HR]) of PAP on MACE risk was 1.21 (95%CI: 0.70-2.09), suggesting that in this emulated trial, PAP was not associated with lower MACE risk, consistent with estimates from SAVE (1.10 [0.91-0.32]).

Conclusion: Emulation of the SAVE trial using Medicare claims data did not show an association between PAP and lower MACE risk. Results suggest that differences between RCTs and observational studies are likely to reflect patient selection (e.g., non-sleepy, secondary prevention, age) rather than biases attributed to observational studies (e.g., healthy adherer bias). This study reinforces the use of TTE to guide the design of robust observational studies assessing the effect of OSA therapies on cardiovascular risk.

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0627

OUTCOMES IN PATIENTS WITH COMORBID OSA AND RLS FOLLOWING TREATMENT WITH URS-HGNS THERAPY: RESULTS FROM THE ADHERE REGISTRY

Reena Dhanda-Patil¹, Stephanie Stahl², Reena Mehra³, Ryan Soose⁴

¹Northwestern University, ²Indiana University School of Medicine, ³University of Washington, ⁴University of Pittsburgh

Introduction: Restless leg syndrome (RLS) is a common chronic neurological disorder, which can cause sleep disturbances, similar to those seen in patients with obstructive sleep apnea (OSA). Literature suggests that the prevalence of comorbid OSA and RLS (ComOSAR) is 16-24%. Unilateral hypoglossal nerve stimulation with respiratory sensing (URS-HGNS) is a proven therapy for moderate-to-severe OSA patients who struggle with positive airway pressure (PAP). Given the issues with insomnia related to ComOSAR, determining whether treatment of OSA using URS-HGNS is effective in these patients is of interest.

Methods: The ADHERE Registry is a real-world registry of 5,000 enrolled participants who were implanted with URS-HGNS throughout the US and Europe. Patients were followed up to 2 years post-implant. RLS was captured as a comorbidity in the ADHERE Registry starting in March 2020. Therefore, patients were included in this analysis (n=1689) if they were enrolled after March 2020 and had a final follow-up visit with at least one of the following reported: AHI, ESS or therapy use. Follow-up information for this analysis includes an all-night sleep study (with no device setting changes), daytime sleepiness (ESS) and therapy adherence. Patients with RLS were matched to those without RLS based on: age, gender, baseline AHI, prior OSA treatment.

Results: Per the matched patient analysis, a total of 53 patients with RLS were matched to those without RLS. There were no significant differences in demographics or baseline AHI and ESS. Patients in the RLS group were found to have significantly lower final median AHI (10.5 vs.15.8, p=0.043) compared to non-RLS patients. ESS improved with URS-HGNS treatment in both groups. Final median ESS in the RLS group was not significantly different than the non-RLS group (8.0 vs 6.0, p=0.41). Similarly, mean therapy use was similar between the two groups (6.0±2.1 vs 6.3±2.1 hours/night, p=0.42).

Conclusion: This matched patient analysis of ADHERE Registry patients demonstrates that patients with ComOSAR are generally well treated with URS-HGNS therapy. The differences in daytime sleepiness and therapy use are neither statistically nor clinically significant.

Support (if any): The ADHERE Registry is sponsored by Inspire Medical Systems, Inc.

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0628

A BEHAVIORAL INTERVENTION TO ADDRESS PAP NONADHERENCE IN MIDDLE-AGED AND OLDER VETERANS WITH OBSTRUCTIVE SLEEP APNEA: A RANDOMIZED CONTROLLED TRIAL

Monica Kelly¹, Constance Fung², Armand Ryden³, Carl Stepnowsky⁴, Alexander Erickson⁵, Michelle Zeidler⁶, David Ganz⁷, Michael Mitchell², Lori Pearson⁷, Karen Josephson⁷, Jennifer Martin⁸, Cathy Alessi²

¹David Geffen School of Medicine, University of California Los Angeles, ²Geriatric Research, Education and Clinical Center, VA Greater Los Angeles Healthcare System, ³UCLA, ⁴VA San Diego Healthcare System, ⁵National Sleep Foundation, ⁶Department of Medicine, David Geffen School of Medicine, University of California Los Angeles, ⁷VA Greater Los Angeles, ⁸VA Miami Healthcare System, Geriatric Research, Education and Clinical Center

Introduction: Nearly half of patients with obstructive sleep apnea (OSA) who begin positive airway pressure (PAP) therapy discontinue use within a year. While behavioral interventions improve initial PAP use, less evidence exists on addressing longstanding insufficient PAP use.

Methods: A randomized controlled trial tested the efficacy of a manual-based behavioral treatment (provided by a non-clinician sleep coach, supervised by a behavioral sleep medicine specialist) to address insufficient PAP use among middle-aged and older adults with OSA (apnea-hypopnea index >15) prescribed PAP therapy 1-5 years prior who were nonadherent (< 90 out of 180 days of PAP use and no use over the past 30 days). Participants received a new PAP device if needed and were randomized to either intervention or a control sleep education program (both groups received 5 weekly sessions and monthly telephone calls for 6 months). Primary outcomes: mean hours of PAP use per night via remote monitoring over days 1-180 (T1, primary) and 181-365 (T2, secondary) post-randomization. Independent groups t-tests compared PAP use between groups. Secondary outcomes: nights PAP used >4 hours and Epworth Sleepiness Scale (ESS) at baseline, 6- and 12-months post-randomization.

Results: Among 106 participants (n=53 per group) aged 51-90 (mean=66.3±9.4 years, 88.7% males), intervention participants averaged 1.3 more hours of PAP usage per night than controls during T1 (2.2 versus 0.9 hours/night, $p < 0.001$, 95% CI=0.6, 1.9), and 1.1 more hours per night during T2 (1.6 versus 0.4 hours/night, $p < 0.001$, 95% CI=0.5, 1.7). Intervention participants used PAP for >4 hours on 30.1 more nights versus controls (51.2 versus 21.1 nights, $p < 0.001$, 95% CI=13.4, 46.8) during T1 and 26.2 more nights during T2 (37.1 versus 10.9 nights, $p < 0.001$, 95% CI=11.0, 41.3). Intervention participants also showed significant ESS reductions ($p < 0.001$) from 9.5 at baseline to 6.1 at 6-month and 6.8 at 12-month follow-ups. Controls had no significant reduction in ESS (8.3 at baseline to 7.6 at 6-months and 8.0 at 12-months).

Conclusion: These findings suggest that behavioral interventions can improve PAP use and decrease daytime sleepiness (a hall-

mark symptom of untreated OSA) among middle-aged and older Veterans with long-term PAP adherence difficulty.

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0629

CHARACTERIZING AND PREDICTING HYPOGLOSSAL NERVE STIMULATOR OUTCOMES: UPDATED ANALYSIS FROM AN URBAN SLEEP CLINIC

Shide Zhang¹, Jasmit Minhas², Matthew Boliaux², Srikar Vegesna², Sanjay Kaji³, Elysha Walters², Pooja Rangan²

¹University of Arizona Medical School -Phoenix, ²University of Arizona Medical School - Phoenix / Banner University Medical Center -Phoenix, ³University of Arizona College of Medicine Phoenix

Introduction: Obstructive sleep apnea (OSA) is a common condition linked to significant morbidity. Hypoglossal nerve stimulation (HGNS) is an important treatment option for selected patients with moderate to severe OSA who cannot tolerate positive airway pressure therapy. However, predictors of successful HGNS outcomes remain unclear. This pilot study sought to identify demographic and clinical factors associated with HGNS treatment success in patients at a Southwestern urban outpatient sleep clinic.

Methods: 72 patients who underwent HGNS implantation between 2019 and 2025 were reviewed; 30 met inclusion criteria by completing a follow-up sleep study and alive at analysis. Most excluded patients are pending follow-up. Demographics, BMI, polysomnographic data, and comorbidities were collected. Treatment success was defined as $\geq 50\%$ reduction in apnea-hypopnea index (AHI) and/or post-treatment AHI < 15 events/hour at optimal settings, combined with adequate adherence. Univariable linear regression assessed continuous variables, chi-square testing assessed categorical variables, and logistic regression generated odds ratios with 95% confidence intervals.

Results: Of the 30 included patients, 25 achieved treatment success and 5 did not. The cohort included 19 males and 11 females; 25 patients identified as White and 5 as non-White. Three patients were using GLP-1 receptor agonists. The non-successful group had a higher mean pre-treatment AHI (43.0 ± 13.2) than the successful group (31.3 ± 18.0). Mean age at implantation was 59.7 ± 8.8 years in the non-successful group and 62.8 ± 10.4 years in the successful group. Pre- and post-treatment BMI values were similar between groups. Mean oxygen nadirs were 83% in the non-successful group and $81\% \pm 3.2\%$ in the successful group. Time to device activation differed, averaging 35.8 ± 6.7 days in the non-successful group versus 56.2 ± 7.2 days in the successful group. Odds of non-success were modestly higher among patients with insomnia (OR 1.42) and among females (OR 1.18), though confidence intervals were wide.

Conclusion: In this pilot sample, higher baseline AHI appeared to be associated with HGNS treatment failure. Female sex and comorbid insomnia showed mild trends toward non-success. Larger studies are needed to validate these preliminary findings and to assess additional factors, including GLP-1 agonist use, that may influence HGNS outcomes.

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0630

COMPUTATIONAL MODELING-INFORMED DESIGN OF PROXIMAL HYPOGLOSSAL NERVE STIMULATION USING A MULTI-CONTACT ELECTRODE FOR TARGETED ACTIVATION IN OSA

Rex Chin-Hao Chen, Evan Nicolai, Jean Manuel Prudon, Jason Begnaud
LivaNova PLC

Introduction: During sleep, tongue muscles coordinate protrusion, retraction, and shaping to maintain airway patency. Physiological studies suggest that antagonistic protrusor-retractor co-activation increases stiffness and lowers critical closing pressure compared with protrusor activation alone, whereas isolated retractor activation may worsen collapse. Our proximal hypoglossal nerve stimulation system (pHGNS) uses a six-contact cuff on the proximal nerve trunk; multiple contacts can be grouped and driven simultaneously at independent current levels. This enables activation patterns beyond traditional respiratory-gated airway rescue. In the OSPREY clinical trial, some patients showed limited response to single-contact dosing. We therefore used a biophysical model to design a PolySync™ contact-grouping algorithm that uses single-contact PSG responses and threshold-weighted dosing to explore additional tongue recruitment patterns in prior non-responders.

Methods: We used the ASCENT modeling pipeline (COMSOL finite-element model with NEURON axon models) to simulate activation from a six-contact cuff on the proximal hypoglossal trunk and validated the model against OSPREY sensory thresholds. Using this model, we evaluated two-contact groupings under different current-splitting schemes. Prior single-contact PSG responses were classified as therapeutic, neutral, or anti-therapeutic based on apnea-hypopnea index changes. Combinations of two anti-therapeutic contacts were excluded, while therapeutic or neutral contacts could pair with anti-therapeutic contacts to explore antagonistic co-activation. These contact-level PSG classifications, together with model-derived dosing rules, defined the PolySync™ titration strategy that was then employed in OSPREY non-responder re-titration.

Results: Model predictions reproduced OSPREY sensory threshold trends, with centrally located contacts (relative to cuff insulation) exhibiting lower thresholds than edge contacts. Single-contact stimulation created focal recruitment near individual contacts, whereas grouped contacts distributed current more broadly. Threshold-weighted grouping reduced dominance by low-threshold contacts and produced blended recruitment profiles that reflected both contacts, increasing the diversity of achievable recruitment patterns compared with single-contact dosing. In 10 OSPREY non-responders optimized with PolySync™, 71% (10/14) converted from non-responder to responder.

Conclusion: A computational model validated against clinical thresholds enabled design of contact-grouping strategies for pHGNS. Tailored therapy through electrode grouping broadened current injection, potentially enhancing tolerability and compliance. PolySync™-titrated results suggest that accessing

additional recruitment patterns may support more personalized, tongue-stabilizing pHGNS.

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0631

MANDIBULAR PROTRUSION RANGE (MPR) AS A PREDICTOR OF OUTCOME IN HYPOGLOSSAL NERVE STIMULATION THERAPY FOR OBSTRUCTIVE SLEEP APNEA

Utsav Shrestha¹, Ira Sharma², Edward Rojas¹, Vinita Vaidya³, Asif Rahman¹

¹West Virginia University, ²University of Pittsburgh, ³WVU Medicine Ruby Memorial Hospital

Introduction: Increased MPR may be associated with posterior mandibular collapse during supine sleep, producing a more obstructed airway geometry that demands larger genioglossus displacement (and therefore higher stimulation voltage) for airway patency, leading to smaller reductions in AHI and ESS. Greater mandibular protrusive range (MPR) has been associated with improved responsiveness to mandibular advancement devices (MADs) in obstructive sleep apnea (OSA). However, the role of MPR in predicting outcomes of hypoglossal nerve stimulation (HGNS) therapy has not been evaluated. Patients with mandibular protrusion range (MPR) ≥ 5 mm require higher stimulation voltage to achieve optimal tongue advancement and will show less improvement in daytime sleepiness (ESS) after hypoglossal nerve stimulation therapy than patients with MPR < 5 mm, because posterior displacement/collapse of the mandible in supine sleep increases the mechanical work needed to clear the airway.

Methods: We conducted a retrospective review of 34 consecutive patients treated with HGNS who also had cephalometric measurements, including MPR, obtained during clinical evaluation. Patients were followed for 3 months with titration of stimulation amplitude until patient-reported benefit limited further increases. Collected data included baseline OSA severity, HGNS amplitude settings, Epworth Sleepiness Scale (ESS) scores, demographic characteristics, and adherence.

Results: Twenty-two patients demonstrated an MPR ≥ 5 mm, while 12 had MPR < 5 mm. Patients with higher MPR had similar baseline daytime sleepiness (ESS 10.36 ± 5.17 vs 8.42 ± 5.37). At 3 months post HHNS therapy, patients with MPR ≥ 5 mm showed no significant difference in ESS (8.86 ± 4.65 vs 7.25 ± 4.65) or stimulation amplitude (1.09 ± 0.63 vs 1.22 ± 0.57) as compared to patients with MPR < 5 mm. No differences in therapy adherence were observed between groups. There were no differences in demographics and baseline characteristics in the two groups either.

Conclusion: In this study, mandibular protrusion range (≥ 5 mm vs < 5 mm) was not associated with differences in postoperative ESS improvement or required stimulation voltage, indicating that MPR — at the 5 mm cutoff — is not a reliable independent predictor of therapeutic response or programming intensity for HNST.

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0632

RETROSPECTIVE COHORT ANALYSIS OF DIAGNOSTIC POLYSOMNOGRAPHY TO PREDICT TREATMENT RESPONSE TO HYPOGLOSSAL NERVE STIMULATION IN OBSTRUCTIVE SLEEP APNEA

Ryan Dunn¹, Umesh Goswami¹, Claire Yee¹, Mia Truman¹, Yasemin Tashman¹, Christopher Williams², Timothy Morgenthaler³, Michael Olson⁴, Erik St Louis⁵, Brendon Colaco⁶, Stephen Bansberg¹, Mobashir Shandhi⁷, Ariful Islam⁷, Matt Lizak¹, Chad Ruoff⁵
¹Mayo Clinic Arizona, ²Mayo Clinic Health System, ³Mayo Clinic, Rochester, ⁴Mayo Clinic Rochester, ⁵Mayo Clinic, ⁶Mayo Clinic Florida, ⁷ASU

Introduction: Hypoglossal nerve stimulators (HGNS) are used in patients with moderate-to-severe obstructive sleep apnea (OSA) who are unable to tolerate or do not respond to continuous positive airway pressure (CPAP) therapy. However, a subgroup of patients fail to achieve resolution of OSA with HGNS alone. Previous studies have shown that lower BMI, lower nadir oxygenation, decreased sleep latency, and higher VOTE score on drug-induced sleep endoscopy (DISE) predict better treatment outcome. We hypothesize that baseline diagnostic polysomnography (PSG) may further predict which patients will achieve successful therapeutic outcome with HGNS therapy.

Methods: We conducted a retrospective analysis of all adult patients who underwent HGNS implantation at Mayo Clinic Arizona between 2019-2025 and had a pre-implantation diagnostic PSG available for review. Treatment success was defined by Sher Criteria: >50% reduction in post-treatment apnea hypopnea index (AHI) to a final AHI of < 20/hr. Responders met Sher criteria and non-responders did not meet Sher criteria. Demographics, sleep questionnaire results, PSG variables, and VOTE score on DISE were collected and analyzed using Spearman's rank correlation of reduction in AHI.

Results: Twenty-three patients (11M/12F, median age: 69[IQR:64,75] years) met inclusion criteria. Median baseline AHI was 24[IQR:19,37]/hr. Median post-implant AHI was 8 [IQR:3, 14]/hr. Responders (n=15, 65%) and non-responders (n=8, 35%) demonstrated median post-implant AHI of 4.5[IQR:2.3,7.3]/hr and 15.7[IQR:12.3,28.5]/hr, respectively. Treatment response was associated with less time with SpO₂ < 88% (T88%) (21min [IQR:3,64] vs. 73[IQR:36,105mins]; p=0.023) and higher central apnea index (CAI) (1[IQR:0.1,3] vs. 0[IQR:0,1], p=0.03) on pre-implantation PSG.

Conclusion: In this small cohort of OSA patients, less nocturnal hypoxemia as defined by T88% and higher baseline central apnea index were predictors of better treatment response to HGNS therapy as measured by Sher criteria. We hypothesize that greater nocturnal hypoxemia likely reflects more severe airway obstruction during sleep. Our analysis also showed that responders had higher baseline CAI than non-responders, however we believe this association is not clinically significant and likely driven by one outlier (CAI 13/hr). Further analysis in a larger HGNS cohort is

needed to confirm these findings. Data enrichment efforts and more sophisticated analyses are underway.

Support (if any):

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0633

HYPOGLOSSAL NERVE STIMULATION FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA IN 4 ADOLESCENTS WITH TRISOMY 21

Lucas Sittner, Jarod Pamatmat, Silvan Pender
 University of Oklahoma Health Sciences Center

Introduction: OSA is one of the most common comorbidities seen in pediatric patients with Trisomy 21 (T21) with a prevalence of up to 79% compared to 1-5% seen in the general pediatric population. Uncontrolled OSA can have serious clinical consequences, including cognitive and behavioral impairment and cardio-respiratory sequelae such as pulmonary hypertension, making OSA particularly important to treat. Unfortunately, OSA can be difficult to manage in patients with T21 due to a multitude of anatomic risk factors and difficulties with adherence to standard therapy (i.e. positive airway pressure). However, hypoglossal nerve stimulation (HNS) has recently emerged as a promising therapy for adolescents with T21. In this study, we aimed to evaluate the safety and efficacy of HNS in adolescents at Oklahoma Children's Hospital.

Methods: In a retrospective chart review, we evaluated the tolerance, subjective changes, and apnea-hypopnea index (AHI) differences before and after implantation of HNS in adolescents with T21. Baseline data included demographics, patient/parental experience, and polysomnography (PSG) results. Only adolescents (ages 13-19) with T21 were included. The primary outcome measurement was AHI following HNS implantation compared to AHI prior to HNS implantation. Secondary outcomes included tolerance to the HNS device and subjective differences in symptoms after implantation.

Results: We evaluated 4 adolescents who received HNS implantation. Each patient had improvement in AHI with absolute decreases ranging from 7.8-35.64 (average of 17.5) and relative decreases ranging from 51.7-85.7% (average of 72.0%). Furthermore, caretakers of each patient also reported subjective improvement in sleep symptoms and quality of life, including improvements in snoring, nighttime restlessness, daytime somnolence, and school performance.

Conclusion: While OSA can be a difficult disease to control in patients with T21, HNS appears to be a viable and effective option for management of treatment-resistant OSA in adolescents with T21 with this case series showing improvements in both subjective and objective outcomes for OSA in every patient. This study was limited by the small number of pediatric patients with T21 and HNS along with a lack of formal tools to assess tolerance and improvements in quality of life. Future research is needed to assess long-term safety and efficacy of HNS in children.

Support (if any):

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0634

A NOVEL APPROACH FOR OSA TREATMENT IN CPAP-INTOLERANT PATIENTSLouise O'Brien¹, Jeff Plott¹, Mariam Nazjoo¹, Zahra Nourmohammadi¹, Tom Marten², Glenn Green¹, David Zopf³¹Michigan Medicine, ²University of Michigan, ³University of Wisconsin

Introduction: CPAP is the first-line treatment for OSA, although adherence is universally low with estimates at ~50%. Current alternatives to CPAP involve complex, highly invasive surgical procedures (e.g. maxillomandibular advancement surgery) as well as implantable medical devices for delivering hypoglossal nerve stimulation. This affirms an urgent need for an acceptable alternative to CPAP therapy. We have developed a nasopharyngeal/oropharyngeal airway device ("NPOP"), a flexible, medical-grade silicone, open channel tube-like device that is self-inserted into the nasopharyngeal airway through one nostril. It is held in place via an integrated nose clip. We present initial findings of the NPOP device.

Methods: This pilot feasibility study recruited patients with moderate-to-severe obstructive sleep apnea who did not tolerate CPAP to test the device and provide feedback about insertion and comfort. Each participant underwent overnight polysomnography before using the device and again after one month of use. Polysomnographic measures were compared using paired t-tests.

Results: Thus far four male participants have completed the trial. Mean age was 62±9.1 years and mean apnea hypopnea index (AHI) was 43.8±21.7. All four found the NPOP moderately easy/very easy to insert. Two were able to sleep all night with the device in place from the first night while the other two were able to sleep with the device within five nights. After one month of use repeat polysomnography demonstrated a slight reduction in overall AHI (43.8±21.7 to 32.7±17.6; $p=0.04$). The obstructive apnea index was reduced from 8.3±12.6 to 0.1±0.3 ($p=0.1$) and the central apnea index was reduced from 5.1±4.7 to 3.1±3.5 ($p=0.05$). The hypopnea index was unchanged (30.5±13.2 to 29.4±17.5). Oxygenation nadir improved from 79.5±5.3% to 82.5±5.9%; $p=0.1$, and time spent with oxygenation below 88% was reduced from 4.3±6.8% to 0.9±1.3%; $p=0.1$. Importantly, no serious device-related adverse events were reported.

Conclusion: Initial clinical experience suggests that the NPOP is a promising non-surgical, minimal risk and easy-to-implement approach for the reduction of obstructive apneas in a hard-to-treat population. The device does not require elaborate infrastructure, therefore may additionally have application for lower resource settings. Future work will focus on design modification to not only alleviate obstructive events but also to reduce hypopneas.

Support (if any): UM-Coulter Program

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0635

COMPREHENSIVE ASSESSMENT OF A 5,000 PATIENT LONGITUDINAL HYPOGLOSSAL NERVE STIMULATION REGISTRY: FINAL RESULTS OF THE ADHERE REGISTRYRyan Soose¹, Colin Huntley², Reena Dhanda-Patil³, Stephanie Stahl⁴, Reena Mehra⁵, Armin Steffen⁶¹University of Pittsburgh, ²Thomas Jefferson University and Hospital, ³Northwestern University, ⁴Indiana University School of Medicine, ⁵University of Washington, ⁶University of Lübeck

Introduction: Obstructive sleep apnea (OSA) is commonly associated with impaired sleep quality, daytime function, and cardiometabolic risk. Unilateral hypoglossal nerve stimulation with respiratory sensing (URS-HGNS, Inspire Medical Systems, Inc.) is a proven therapy with established safety and efficacy through the STAR pivotal trial. A global registry was established to collect information on the outcomes of URS-HGNS in a real-world setting.

Methods: The registry was designed to enroll 5,000 participants who were implanted with URS-HGNS throughout the US and Europe. Baseline information included demographics, medical history, sleep study results, and daytime sleepiness using the Epworth Sleepiness Scale (ESS). Data was captured at post-titration (6 months post-implant) and a final visit (up to 2 years post-implant). Patient reported outcomes included ESS and patient satisfaction. Follow-up information also included therapy use and the Clinical Global Impression of Improvement (CGI-I). An optional all-night sleep study - without changes to device settings - was performed at the final visit.

Results: Participants were primarily white (92.4%) males (71.6%) with a mean age of 61.2±11.0 years, mean BMI of 29.2±3.6 kg/m², baseline median AHI of 32.0 events/hr and median ESS of 11. Prior PAP use was reported in 95.6% of participants. Results of the reported sleep studies demonstrate a significant reduction in OSA severity. Post-titration reported sleep studies (a mix of titration and all-night effectiveness; N=3745) show a median AHI of 9.9 events/hr, $p < 0.001$. Final visit all-night effectiveness sleep studies (attended by 2,344 participants) result in a median AHI of 12.3, $p < 0.001$; with a median decrease in AHI of 62%. Significant improvement in daytime sleepiness was reported, resulting in a median ESS score of 6 at both post-titration and final follow-up ($p < 0.001$). Patient satisfaction was 87.9% at final visit. Mean therapy usage was 6.4±2.2 hours/night at post-titration and 5.8±2.2 hours/night at final visit. CGI-I showed that 90% of physicians saw improvement in their patients.

Conclusion: This global registry of URS-HGNS demonstrates durability of the therapy in a real-world population with results that are aligned with the initial pivotal trial.

Support (if any): The ADHERE Registry is sponsored by Inspire Medical Systems, Inc.

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0636

DEVELOPMENT OF A PROGNOSTIC CALCULATOR FOR TREATMENT RESPONSE AFTER HYPOGLOSSAL NERVE STIMULATIONPhoebe Yu¹, Wilson Zheng¹, Philip Huyett²¹Massachusetts Eye & Ear/Harvard School of Medicine,²Massachusetts Eye & Ear Institute

Introduction: Hypoglossal nerve stimulation (HGNS) is an increasingly utilized alternative treatment option for obstructive sleep apnea in patients who are intolerant of positive airway pressure. Treatment response rates vary considerably after HGNS, with reported success rates around 66-72% among patients meeting Food and Drug Administration eligibility criteria. Improved understanding of the prognostic factors that contribute to treatment outcomes is needed to optimize patient selection. Our objective was to develop a prognostic calculator to support clinicians in identifying patients likely to achieve favorable treatment response to HGNS.

Methods: We analyzed a cohort of 528 patients who underwent HGNS at a single academic institution. The primary outcome was

the change in the apnea-hypopnea index (AHI) between sleep studies performed preoperatively and postoperatively approximately 4 months after implantation. Linear regression was used to identify predictors of treatment response.

Results: The majority of patients were male (67.4%) with a mean age of 60.8 years, baseline body-mass index (BMI) of 28.5 kg/m², and baseline AHI of 32.9 events/hour. The mean postoperative change in the AHI from baseline was -20.8 events/hour. Multi-variable regression modeling that included gender, age, BMI, baseline AHI, and sleep endoscopy findings as scored by the Velum Oropharynx Tongue Epiglottis (VOTE) system was performed. The strongest predictors of postoperative change in AHI was the baseline AHI ($B=0.26$; 95% CI 0.17-0.34; $p<0.0001$) and partial circumferential collapse of the velum ($B=7.70$; 95% CI 3.14-12.3; $p=0.001$). The regression model was then used to develop a web-based calculator that clinicians can use to estimate the predicted change in AHI with HGNS.

Conclusion: Understanding the prognostic factors that contribute to treatment response after HGNS can facilitate personalized care in OSA management. Future directions include validating the utility of this calculator as a clinical support tool and expanding its application to other treatment modalities and other outcomes beyond AHI.

Support (if any):

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0637

ENHANCING RESPONSE TO PROXIMAL HYPOGLOSSAL NERVE STIMULATION (PHGNS) WITH PAIRED RATHER THAN SINGLE ELECTRODE STIMULATION IN MODERATE TO SEVERE OSA

Alan Schwartz¹, Ofer Jacobowitz², Jean Manuel Prudon³, Steve Morris³, Charles Gordon³, Robyn van Poelgeest³, Atul Malhotra⁴

¹University of Pennsylvania, Perelman School of Medicine, ²ENT and Allergy Associates, ³LivaNova PLC, ⁴UC San Diego Health

Introduction: The THN3 and OSPREY randomized clinical trials (RCT) demonstrated substantial improvements in moderate to severe obstructive sleep apnea (OSA), sleep architecture and quality of life in actively treated vs. sham controls. Both trials rotated stimulation of selected single electrodes from six circumferentially arranged cuff electrodes. We hypothesized that further reductions in apnea-hypopnea index (AHI) could be achieved in OSPREY non-responders by simultaneously stimulating electrode pairs and activating greater portions of the lingual musculature.

Methods: 26 OSA patients (age: 53.8±8.9yr; sex: 22M, 4F; BMI: 31.9±2.4kg/m²; AHI: (38.3±13.3/hr) whose endpoint AHI did not meet Sher's responder criteria were recruited for paired-contact stimulation. A rotating sequence of contact pairs was assembled from single contacts that previously demonstrated either neutral or increased airflow during sleep when stimulated ("PolySync"). Electrode pairs were titrated during polysomnography (PSG), followed by acclimatization for ≥3 weeks. Therapeutic effectiveness was determined thereafter on an unmanipulated PSG. AHI changes from Baseline were compared for (a) single- vs. paired-contact pHGNS nights, and for (b) paired-contact pHGNS vs. Controls nights (to account for night-to-night AHI variability).

Results: Of 26/35 Sher non-responders, 14 completed the re-titration protocol to date. PolySync achieved a Sher AHI response in 10/14 (71%). AHI reduction was substantially larger in paired

than single pHGNS regimens (-19.7±17.6/hr vs. -3.0±15.5/hr, respectively) and compared to that of Controls (+1.7±16.7/hr). Of note, Baseline AHI in paired-pHGNS and Controls were similar (38.3±13.3/hr vs. 36.1±12.0/hr).

Conclusion: Paired-electrode pHGNS applied via PolySync algorithm markedly improved AHI responses over single-contact stimulation in the OSPREY RCT. Paired pHGNS converted the majority of non-responders into responders, well beyond that expected from night-to-night AHI variability. Improved paired responses may be attributed to (a) greater comfort at lower stimulation amplitudes and (b) broader activation of the tongue musculature by fixing tongue shape, stiffness and extent of tongue protrusion.

Support (if any): Supported by LivaNova Inc.

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0638

EVALUATING OUTCOMES OF A SLEEP MEDICINE SCREENING PROGRAM FOR HYPOGLOSSAL NERVE STIMULATION: A SINGLE CENTER RETROSPECTIVE COHORT STUDY

Ashley Vojtek, Luke Ciminera, Merritt Ebner, Sara Larios, Aileen Love
Lehigh Valley Health Network/Jefferson

Introduction: Positive airway pressure (PAP) remains the first-line treatment for moderate to severe obstructive sleep apnea (OSA). Due to high rates of PAP intolerance, Inspire's hypoglossal nerve stimulation (HNS) system, is an FDA-approved alternative treatment option. At large academic centers, HNS programs are often led by sleep medicine-trained surgeons. As HNS treatment expands to hospitals without sleep-trained surgeons, alternative models are needed to evaluate patients interested in HNS. We developed a sleep medicine-led HNS program in which all patients expressing interest in HNS were evaluated by sleep medicine clinicians. Patients who met clinical criteria for HNS were referred for surgical evaluation. This single center retrospective cohort study reports outcomes for patients who were evaluated for HNS but did not undergo implantation.

Methods: Between 1/1/2023 to 6/30/2024, there were 288 patients who underwent sleep medicine consultation for HNS at LVHN; these charts were retrospectively reviewed.

Results: Out of 288 patients referred to sleep medicine for HNS, 9.4% underwent implantation with 89% of patients with use >4 hours per night. Among the patients who did not undergo surgery, the most common reasons were patient choice (41.4%), mild OSA or no OSA on sleep testing (23.7%), elevated BMI (16.1%), >25% central sleep apnea/mixed apneas (4.6%), and untreated insomnia (4.2%). Other reasons included supine-predominant OSA or significant medical co-morbidities prohibiting elective surgery. Among those who did not undergo implantation, 58.2% were counseled to pursue PAP therapy, 20.3% to pursue oral appliance, 19.2% to pursue positional therapy, and 3.4% were referred to bariatric medicine. Some treatments were concurrently recommended. Of those patients recommended to continue or restart PAP therapy, 53.3% had documented PAP/NIV adherence at follow-up. Interestingly, 7.7% of patients evaluated for HNS required no treatment for OSA as their sleep testing was negative.

Conclusion: Most patients do not meet clinical criteria for surgical implant or ultimately choose not to pursue it. Our sleep medicine-led HNS program demonstrates that evaluating all patients interested in HNS—even when they do not meet FDA guidelines for surgery—can effectively screen patients for surgical candidacy as

well as successfully restart some patients on PAP therapy and offer alternative non-surgical solutions for sleep apnea.

Support (if any):

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0639

EVALUATION OF A NEXT-GENERATION UNILATERAL HYPOGLOSSAL NERVE STIMULATION WITH RESPIRATORY SENSING PLATFORM: DATA FROM THE LIMITED MARKET RELEASE

Thomas Kaffenberger¹, Ryan Nord², Philip Huyett³, Abhay Sharma⁴, Nicholas Beckmann⁵, Ryan Soose¹

¹University of Pittsburgh, ²Virginia Commonwealth University,

³Massachusetts Eye & Ear Institute, ⁴University of South Florida,

⁵Colorado ENT & Allergy

Introduction: The unilateral hypoglossal nerve stimulation with respiratory sensing (UHNS-RS) is an established therapy with sustained improvements in apnea severity, symptoms, and quality of life. Inspire V, the newest generation of this system, brings respiratory sensing into the implantable pulse generator, removing the separate sensing lead and making implantation simpler while keeping the core therapy the same. Early data on performance is limited. Here we describe outcomes from the first 41 patients implanted during the limited market release (LMR) from May - October of 2025.

Methods: This is a retrospective review of 41 patients implanted during the LMR. For this early analysis, we focused on outcomes available across sites, including device-recorded nightly therapy use and whether post-therapy polysomnography (PSG) provided AHI values using established hypopnea scoring rules. Pre-therapy AHI was recorded when provided in the site documentation.

Results: A total of 41 patients were included. Mean nightly therapy use over the 30 days preceding in-laboratory PSG titration was 6.21 ± 2.02 hours/night (median 6.85; range 1.73–9.77). Baseline AHI was 34 ± 13.68 events/hour (median 48; range 16–66), consistent with moderate to severe obstructive sleep apnea. Forty of 41 patients (97.6%) self-reported experiencing benefit from therapy. All patients completed post-therapy PSG titration. Post-treatment AHI was available for 18 studies scored using the AASM $\geq 3\%$ hypopnea rule (mean 5.25 ± 5.56 events/hour; median 3.75; range 0–13) and for 34 studies scored using the CMS $\geq 4\%$ rule (mean 5.33 ± 4.62 events/hour; median 3.5; range 0–14.5); both demonstrated significant improvement from baseline ($p < 0.05$).

Conclusion: In this early limited market release group, the next-generation UHNS-RS platform showed strong early use and good completion of follow-up sleep studies. Data collection is continuing and will be presented.

Support (if any): This study was funded by Inspire Medical Systems.

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0640

HYPOGLOSSAL NERVE STIMULATION FOR OBSTRUCTIVE SLEEP APNEA IN RECURRENT PNEUMOTHORAX: A NOVEL AND SAFE THERAPEUTIC APPROACH IN THE FIRST REPORTED CASE

Christopher Williams, Adel Zurob, Ali Zaid, Hussam Al-Sharif,

Mamta Chhabria, Aryan Shiari

Mayo Clinic Health System

Introduction: Positive airway pressure (PAP) therapy is the standard treatment for obstructive sleep apnea (OSA); however, its use may be contraindicated in patients with recurrent pneumothorax, particularly in the presence of emphysematous lung disease and bleb formation. Hypoglossal nerve stimulation (HGNS) offers a non-positive-pressure alternative for appropriately selected patients. We describe what is, to our knowledge, the first reported case of successful HGNS therapy in an older adult with severe OSA and multiple recurrent pneumothoraces.

Methods: An 87-year-old man with severe OSA (baseline AHI 38, predominantly obstructive events) experienced multiple right-sided pneumothoraces beginning in December 2022, several of which were temporally associated with BiPAP use at 17/9 cm H₂O. His episodes required repeated interventions, including chest tubes, thoracoscopy with apical bleb resection and pleurodesis, and several pigtail catheter placements. Chest CT imaging demonstrated emphysema with multiple blebs, raising concern for the safety of continued PAP therapy. A mandibular advancement device was deemed inappropriate due to disease severity. The patient's BMI was 27 kg/m². HGNS was considered a suitable alternative.

Results: HGNS implantation was completed without complications. At activation, both the sensation and functional thresholds measured 0.8 V, with excellent tongue protrusion and waveform quality. The device was programmed to 0.8–1.8 V with a 30-minute start delay, 12-hour nightly duration, and 15-minute pause. On follow-up, the patient demonstrated excellent adherence (average 70 hours/week), progressed to level 8 (1.6 V), and reported significant clinical improvement with resolution of snoring and apneas. Functional threshold and waveform analysis at 1.6 V remained optimal. Importantly, the patient tolerated HGNS well without any further episodes of pneumothorax following implantation.

Conclusion: HGNS may represent a safe and effective alternative to PAP therapy in patients at risk for pneumothorax. While positive pressure ventilation can theoretically worsen pneumothorax by increasing pleural pressure, HGNS operates through an entirely different mechanism: it maintains upper airway patency without altering intrathoracic pressure dynamics, making it a potentially safer option for select high-risk OSA patients.

Support (if any):

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0641

IMPACT OF HYPOGLOSSAL NERVE STIMULATION ON N3 SLEEP PERCENTAGE: A PRE- AND POST-IMPLANTATION ANALYSIS

Victor Georgiev, Mahesh Thakkar
University of Missouri

Introduction: Hypoglossal nerve stimulation (HNS) is an established therapy for moderate to severe obstructive sleep apnea (OSA) in patients who are intolerant to continuous positive airway pressure (CPAP). While HNS effectively maintains upper airway patency, its longitudinal effect on sleep architecture—specifically the percentage of time spent in slow-wave sleep (stage N3)—remains less understood. In this study, we investigated whether HNS implantation alters the proportion of N3 sleep by comparing pre-implantation and post-implantation polysomnographic data within the same cohort.

Methods: We analyzed data from 8 patients who underwent HNS implantation. Stage N3 sleep percentages were recorded for each patient at two time points: prior to implantation (Baseline) and following implantation (Treatment). Statistical analysis was performed using a paired two-sample t-test to compare the mean percentage of N3 sleep between the pre- and post-implant conditions. The level of significance was set at $p < 0.05$.

Results: The mean percentage of N3 sleep prior to implantation was 5.80% (Variance = 54.03), compared to 4.58% (Variance = 30.66) following implantation. Although there was a slight numerical decrease in N3 sleep percentage post-implant, this difference was not statistically significant ($p = 0.47$, two-tail).

Conclusion: In this cohort, hypoglossal nerve stimulation did not significantly alter the percentage of time spent in stage N3 sleep compared to pre-implantation baselines. These findings suggest that while HNS treats obstructive events, it may preserve the patient's existing sleep architecture regarding slow-wave sleep. Further research with a larger sample size is warranted to confirm these observations and explore long-term effects on sleep stages. This is an ongoing project.

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0642

NEUROMUSCULAR ADAPTIVE THERAPEUTIC EFFECTS OF HYPOGLOSSAL NERVE STIMULATION (HNS) FOR OBSTRUCTIVE SLEEP APNEA (OSA)

Unjung Cho¹, Hye-Jin Moon², Chang-Hoon Lee³, Douglas Trask⁴,
KyoungBin Im⁴

¹Inha University Hospital, ²Soonchunhyang University Bucheon Hospital, ³Seoul National University Hospital, ⁴University of California, Irvine

Introduction: Hypoglossal nerve stimulation (HNS) is an effective yet still evolving treatment for obstructive sleep apnea (OSA). During titration polysomnography (PSG), some nightly HNS users show lower apnea-hypopnea index (AHI) before stimulation, suggesting a possible adaptive response of upper-airway muscles. This study aimed to characterize this pattern and identify related clinical factors.

Methods: We retrospectively analyzed 113 adults who received HNS at the hospital based sleep laboratory. All participants completed a baseline sleep study, followed by a titration PSG approximately three months after activation. The primary outcome was the change AHI across three conditions: baseline, the device-OFF, and the device-ON period during the titration PSG. Paired AHI values were compared using Wilcoxon signed-rank tests. Factors associated with the percentage reduction in AHI from baseline to the device-OFF period were examined using linear regression.

Results: Total AHI decreased markedly from baseline (34.8 [23.3–47.6]) to the OFF period (4.7 [0.0–27.3], $p < 0.001$) and to the ON period (13.1 [6.0–26.2], $p < 0.001$). AHI increased from OFF to ON ($p = 0.04$). In NREM subset ($n = 45$), baseline NREM AHI (30.2 [19.4–46.6]) decreased to 4.4 [2.0–20.0] during OFF ($p < 0.001$) and to 9.5 [4.9–21.6] during ON ($p < 0.001$), with no significant difference between OFF and ON ($p = 0.50$). Higher BMI was the only variable associated with smaller OFF-period improvement ($\beta = -3.9$, $p = 0.04$), and this association remained significant in multivariable models ($\beta = -4.0$, $p = 0.03$). Benzodiazepine use and male sex showed borderline associations. These factors were associated with less neuromuscular adaptation.

Conclusion: Participants demonstrated marked AHI improvement three months after HNS initiation, with this improvement evident even during the device-OFF period. This pattern supports the possibility that HNS elicits a neuromuscular adaptive effect beyond immediate stimulation. Higher BMI was associated with a smaller adaptive change, suggesting that participant characteristics may influence the extent to which this carryover effect emerges. These findings indicate that long-term HNS therapy may warrant protocol adjustments or individualized titration as the aforementioned adaptive effects may develop.

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0643

NEXT-GENERATION HYPOGLOSSAL NERVE STIMULATION THERAPY FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA: FINAL STUDY RESULTS

Toh Song Tar¹, Adele Ng¹, Shaun Loh Ray Han¹, Pei Rong Song¹,
Jaclyn Teo¹, Shakina Binte Abdul Rahim¹, Nurina Binte Mohd Isa¹,
Sze Hwee Goh¹, Stephanie Png¹, Hairul Bin Borhan²,
Hafiz Firdaus Bin Abdul Haddy², Muhammad Alif Bin Ramlan²,
Crystal S.J. Cheong²

¹Singapore General Hospital, ²National University Hospital

Introduction: Unilateral hypoglossal nerve stimulation with respiratory sensing (URS-HGNS) is a proven therapy for moderate-to-severe Obstructive Sleep Apnea (OSA) patients who struggle with PAP. The next-generation URS-HGNS System (Inspire V) is designed to simplify the procedure by including sensing technology within the implanted pulse generator (IPG). It is also designed to provide enhanced patient comfort and more efficient patient management. This study includes results of the first implants of this next-generation technology.

Methods: This prospective, multicenter study of 44 patients at 2 centers in Singapore, with the URS-HGNS system, followed participants for 6 months post-activation. Baseline and medical history were collected, including in-lab polysomnography. Implant duration was reported and compared to the previous generation. Participants underwent in-lab polysomnography at 6

months (performed at a single device setting). Epworth Sleepiness Scale (ESS) and Function Outcomes of Sleep Questionnaire (FOSQ) were collected at baseline and 6 months. Patient satisfaction was reported at 6 months.

Results: A total of 44 participants (88.6% male; mean age: 55.7±10.2 yrs; baseline BMI: 26.9±2.8 kg/m²) were enrolled and successfully implanted. No device revisions or explants were reported. Implant times decreased by 20.4% compared to the previous URS-HGNS system. Respiratory sensing was superior to the previous generation of technology (Inspiratory Phase Overlap Percent: 87.1% vs 79.4%, $p < 0.001$). One patient exited prior to 6-month visit (declined further study visits but remains in follow-up). A significant reduction in OSA severity was reported at 6 months (mean AHI decrease: 25.5±14.6 events/hr, $p < 0.001$; from median AHI of 34.4 at baseline to 8.4 at 6 months). Supine AHI decreased 68.1%, from median of 36.5 at baseline to 12.3 at 6 months. The Sher20 responder rate was 79.5% (assumes early exit was a non-responder). Mean adherence at 6 months was 5.9±1.2 hrs/night. Daytime sleepiness normalized at 6 months (median 7, p -value < 0.001) with a decrease in ESS from 11 to 7. FOSQ showed improvement from 15.0 to 17.9, p -value < 0.001. Patient satisfaction was 91%.

Conclusion: This next generation URS-HGNS technology facilitates more efficient implants, significant improvements in OSA severity and symptoms, and excellent therapy adherence.

Support (if any): The Next Generation Study is sponsored by Inspire Medical Systems, Inc.

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0644

REAL WORLD COMPARISON OF PATIENT COMPLIANCE AND EFFICACY USING CONTINUOUS POSITIVE AIRWAY PRESSURE VERSUS HYPOGLOSSAL NERVE STIMULATION

Julio Roque Buenrostro¹, Saif Salih¹, Thomas Cyberski², James Herdegen², Michael Hutz²

¹Rush Medical College, ²Rush University Medical Center

Introduction: Obstructive sleep apnea affects millions worldwide, with continuous positive airway pressure (CPAP) remaining first-line therapy despite persistent adherence challenges. Hypoglossal nerve stimulation (HGNS) offers an alternative for appropriately selected patients. This study compares treatment adherence and Median Disease Alleviation (MDA) between CPAP and HGNS in the same patient cohort using multiple AHI thresholds and time-points.

Methods: This retrospective cohort study (2016-2024) examined 45 patients with moderate-severe OSA initially treated with CPAP who later transitioned to HGNS. Patients served as internal controls. CPAP adherence data from ResMed Airview and HGNS adherence from SleepSync were collected at 30-day and 90-day time-points. Median Disease Alleviation was calculated using target AHI thresholds of both 3 and 4 events/hour for each therapy. Adherence and efficacy were compared using paired t-tests.

Results: The cohort (n=45) was predominantly male (71.1%), White (77.7%) and non-Hispanic (88.8%). The mean age was 58.2 years (SD 10.4), the mean BMI was 28.8 kg/m² (SD 3.01) and the mean baseline AHI was 42.8 events/hour (SD 15.6). CPAP adherence at 30 days was 56.3% compared to 93.1% for HGNS

($p < 0.001$). At 90 days, CPAP adherence remained 55.8% while HGNS adherence was 91.7% ($p < 0.001$). Using a 4% AHI threshold, median disease alleviation was 52.7% for CPAP versus 87.6% for HGNS. With a 3% AHI threshold, median MDA was 54.1% for CPAP versus 89.2% for HGNS. Statistical analysis demonstrated significantly superior HGNS adherence at both timepoints with large effect sizes (Cohen's $d > 1.0$).

Conclusion: These findings demonstrate that HGNS therapy achieves approximately 65% greater median disease alleviation than CPAP, primarily through dramatically improved adherence sustained over 90 days. The substantial compliance advantage of HGNS translates to enhanced real-world therapeutic benefit regardless of AHI threshold used. Superior adherence may improve long-term cardiovascular and quality-of-life outcomes. Further prospective studies examining long-term efficacy and patient-reported outcomes are warranted.

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0645

REVISION AND EXPLANTS RATES BY YEAR FOR CLOSED LOOP UPPER AIRWAY STIMULATION

Mark Aloia, Israel Byrd, Nicole Karsky, Andrea Rasmussen
Inspire Medical Systems

Introduction: As part of the approval to market and sell implanted medical devices, regulatory bodies mandate device manufacturers to collect data for any surgical revisions or explants required by their device. Combining this post market surveillance data with total implant counts can provide the real world rates for these procedures and help determine whether the safety data produced in a pivotal approval trial holds up in broad clinical applications. We calculated the cumulative revision and explant rates for the closed loop upper airway stimulation device produced by Inspire Medical Inc. (Golden Valley, MN USA).

Methods: Counts of revision and explant procedures were extracted from Inspire Medical Incorporated's post market surveillance data. Procedures were grouped by calendar year of initial implant, and rates were calculated using the corresponding year's total implant count. Implants prior to 2018 were excluded.

Results: Within 3 years of implant, cumulative revision procedures - shown as percent (implant year) - were 5.5% (2018), 3.4% (2019), 3.6% (2020), 2.6% (2021), and 2.6% (2022). Cumulative explant rates for this period were 2.4% (2018), 2.1% (2019), 2.5% (2020), 1.5% (2021), and 1.5% (2022). Within five years of implant the cumulative revision rates were 8.5% (2018), 5% (2019), and 4.8% (2020). Cumulative explant rates for this period were 4.3% (2018), 3.4% (2019), and 3.1% (2020).

Conclusion: Overall, the risk of surgical revision or explant of the closed loop upper airway stimulator is low. That the explant rates are lower than the revision rates suggest the patients receive a clinical benefit from the device and prefer to correct the underlying problem rather than remove the device. This analysis shows a trend of decreased events by later implant years, suggesting that improvements in the device components as well as surgical training have reduced patient risk.

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0646

SINGLE AND COMBINATION HYPOGLOSSAL/ANSA CERVICALIS NERVE STIMULATION INCREASES AIRFLOW TO AIRWAY NARROWING IN OBSTRUCTIVE SLEEP APNEA

Amal Osman¹, A. Simon Carney², Eng H. Ooi¹, Himani Joshi¹, Nick Gelekis¹, Charmaine O'Reilly¹, Carolin Tran¹, Anna Hudson¹, Daren Gibson³, Peter Catcheside¹, Jennifer Walsh³, Kathleen Maddison³, Stuart Mackay⁴, Richard Lewis⁵, Danny Eckert¹
¹Flinders Health and Medical Research Institute/Adelaide Institute for Sleep Health, College of Medicine and Public Health, Flinders University, Bedford Park, ²Flinders Health and Medical Research Institute/Adelaide Institute for Sleep Health, College of Medicine and Public Health, Bedford Park, ³Centre for Sleep Science, University of Western Australia, Perth, WA, Australia, ⁴Wollongong Hospital, Illawarra Shoalhaven Local Health District (ISLHD), Wollongong, Australia, ⁵Hollywood Hospital, Perth, Western Australia

Introduction: Hypoglossal nerve stimulation via surgical implantation of a pulse generator and cuff electrode is an effective therapy for many people with obstructive sleep apnea (OSA). However, therapeutic responses vary and are difficult to predict. Recent studies indicate that ansa cervicalis nerve stimulation can also restore airflow via airway stiffening and caudal traction mechanisms. We used a minimally invasive, ultrasound-guided approach to implant a temporary electrode array to stimulate hypoglossal and ansa cervicalis nerves alone and in combination. **Methods:** People with OSA (AHI > 15 events/h) had a drug-induced sleep endoscopy (DISE). Ansa cervicalis and hypoglossal nerves were identified via ultrasound to guide percutaneous implantation of temporary multi-electrode arrays. A modified continuous positive airway pressure (CPAP) device attached to a nasal mask and pneumotachograph was used to deliver transient reductions in airflow. Different combinations of electrical stimulation (either nerve alone or both) were then applied and airflow responses were quantified. A sub-sample of participants with improved airflow with stimulation during DISE were then studied overnight during an in-laboratory sleep study.

Results: Twenty-four participants (8 female; BMI = 29 ± 3 kg/m²; aged 55 ± 14 years; AHI = 36 ± 17 events/h) across three centres were studied. Peak inspiratory flow (PIF) during transient CPAP reductions was 0.13 ± 0.11 L/s. Acute hypoglossal nerve stimulation increased airflow to 0.39 ± 0.26 L/s ($p < 0.001$), similar to PIF achieved at the therapeutic CPAP level, 0.40 ± 0.18 L/s ($p = 0.66$). Similarly, ansa cervicalis nerve stimulation increased PIF to 0.36 ± 0.15 L/s ($p < 0.001$). In 5 participants, PIF with ansa stimulation alone was 0.28 ± 0.22 L/s which increased to 0.59 ± 0.44 L/s with combination stimulation. Similarly, in 2 participants, PIF with hypoglossal stimulation alone was 0.09 ± 0.04 L/s which increased to 0.47 ± 0.10 L/s with combination stimulation. Of the nine participants who underwent the overnight sleep study, electrode position and stimulation effectiveness was clearly preserved in three participants who demonstrated airflow increases of 150–220% with single or combination nerve stimulation versus pre-stimulation levels without cortical arousal.

Conclusion: A novel, acute percutaneous stimulation approach targeting hypoglossal and ansa cervicalis nerves improved airflow during airway narrowing/closure under sedation and in some

people during natural sleep with preserved stimulation effectiveness after transfer from DISE theatre to the sleep laboratory.

Support (if any): Invicta Medical (now Restera)

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0647

THE PROMISE AND PITFALLS OF HYPOGLOSSAL NERVE STIMULATION (HNS) IN OBSTRUCTIVE SLEEP APNEA

Aditi Desai¹, Caitlin Wilson², Madeline Succar³, Mina Nader³, Bhavin Dalal³

¹Corewell William Beaumont University Hospital, ²Corewell Health, ³Corewell Health Beaumont University Hospital

Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder associated with cardiometabolic and neurocognitive morbidity. While CPAP remains gold-standard therapy, many patients are intolerant to it. HNS has emerged as an alternative for patients with moderate-to-severe OSA and BMI < 40 kg/m², but adherence and response are variable. This study assesses long-term outcomes, compliance, and symptom improvement among patients using HNS and identifies subgroups more likely to struggle with therapy.

Methods: We conducted a retrospective data-analysis of patients implanted with Inspire HNS and followed at Corewell Health Beaumont University Sleep Clinic from January 2021–December 2024. All patients underwent preoperative drug-induced sleep endoscopy and baseline polysomnography or home sleep apnea testing. Outcomes included apnea-hypopnea index (AHI) reduction, device compliance (> 4 hours per night on > 70% of nights), and Epworth Sleepiness Scale (ESS) improvement (> 10 at baseline to < 10 on follow-up). Patient-reported adverse effects and co-morbid sleep disorders like insomnia and insufficient sleep were also recorded.

Results: 52 patients were implanted with HNS during the study period. Seven were excluded due to lack of follow-up after activation. Of the included 45, ten patients did not complete titration studies and three had no post-titration follow-up. One patient discontinued use due to intolerance and three transitioned to alternate therapies. The mean age was 64.5 years (range 42–83), mean BMI 30.3 kg/m², and 35.6% were female. Mean and median AHI were 31.8 and 24.7, respectively, improving to 8.7 and 1.4 at final titration amplitude. 26 patients (57.8%) met compliance thresholds, with mean nightly use of 6.7 hours; but only 15 maintained the therapeutic amplitude identified during titration. ESS improvement was limited, with 5 patients meeting the criteria. Adverse effects included nocturnal awakenings, jaw pain, neuropraxia, and intolerance to higher amplitudes. Pre-existing sleep disorders strongly influenced outcomes: of 16 patients (35.6%) with insomnia, half demonstrated poor compliance; among 10 patients (22.2%) with insufficient sleep syndrome, 70% were non-adherent.

Conclusion: HNS is an effective alternative for CPAP-intolerant OSA patients; however, compliance and symptom improvement remain inconsistent. Adverse effects and difficulty maintaining therapeutic amplitude limited outcomes. Pre-existing insomnia or insufficient sleep strongly predicted non-adherence, highlighting importance of individualized patient selection and targeted

screening. Future research comparing CPAP and HNS adherence and assessing long-term cardiovascular and quality-of-life outcomes are warranted.

Support (if any):

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0648

DOES TIME MATTER? THE ASSOCIATION OF TIME BETWEEN THE DIAGNOSTIC SLEEP STUDY AND HYPOGLOSSAL NERVE STIMULATOR (HNS) IMPLANT ON AHI REDUCTION

Kimberly Persaud Shewnarain¹, Mahathi Mudigonda¹,

Karthy Thiagarajan², Sreelatha Naik¹

¹Geisinger, ²Geisinger Sleep Medicine

Introduction: The impact of the time between diagnostic study and hypoglossal nerve stimulator (HNS) implantation on treatment success has not been reviewed. Various determinants, including provider preference and insurance approval guidelines, require a baseline sleep study within two years of consultation for HNS. Our study evaluates whether the time elapsed between the diagnostic sleep study and HNS implantation can be used as a metric to predict treatment success.

Methods: A random cohort of patients who underwent HNS implantation at a single institution between 2022 and 2024 was identified from retrospective chart review. Treatment success was defined as an AHI reduction of $\geq 50\%$ from baseline. The impact of the time between diagnostic study and implantation on treatment success was the primary outcome assessed. A two-sample t-test was used to evaluate differences in continuous variables between the group with successful treatment and unsuccessful treatment.

Results: 46 patients were identified from chart review for preliminary analysis of which only 33 patients with pre- and post implantation studies were included in the final statistical analyses. Average age (years) = 62 ± 9.11 , %male = 84.4 (n=27), BMI = 31.31 ± 3.98 Kg/m², and pre-implantation AHI-4% = 33.75 ± 18.87 /hr. Average time from diagnostic study to implant was 372.12 ± 304.32 days, with post-implantation AHI-4% = 17.12 ± 23.91 . 54.55% (n=18) had treatment success. The time between diagnostic sleep study and implantation was 345.61 ± 337.07 days in the treatment success group and 403 ± 267.84 in the treatment failure group (P = 0.590). The average baseline AHI-4% in the treatment success group was 26.8 ± 8.96 , and the treatment failure group 37.62 ± 20.7 (P = 0.076).

Conclusion: Our study does not demonstrate any significant correlation between the time from diagnostic study to implantation on treatment success with HNS. This raises a question as to the rationale in repeating a diagnostic sleep study within 2 years of HNS implantation in those patients whose baseline study predates this. Centers for Medicare and Medicaid Services (CMS) continue to use this cutoff in the Local Coverage Determination (LCD) for HNS implant. Limitations of the data include lack of power of study. Additionally, this data has identified scope for improvement of post implantation sleep testing.

Support (if any):

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0649

HOW AAVOAT (ADAPTIVE ANTERO-VERTICAL OPEN AIRWAY THERAPY) WILL BECOME THE NEW GOLD STANDARD FOR TREATMENT OF OSA

Raghavendra Ghuge, Advait Ghuge

Sleep Medicine Institute of TX

Introduction: Snorers (85%) refuse to seek care due to PAP-phobia. PAP therapy success is poor (Meta-analysis 21.44%). Gen1 precision OAT/COAT devices have gained popularity albeit severe OSA improves by 35%-50% (published studies) and over-advancement results in intolerance similar to high pressure PAP. Multi-level obstructive phenotype limits surgical success (HNS and Hyoid lift). AAVOAT delivers incremental airflow with incremental antero-vertical mandibular rotation resulting in breath-to-breath optimization of alveolar ventilation to meet oxygen demand.

Methods: N=250 OSA (all severities). Dental scan and AI-predictive flange/plateau customization of AIO Breathe[®] with RAP (2mm) and MP (4mm) was initiated. Mandibular translation of 8mm and rotation of 13 degrees, both clinically confirmed on all patients and randomly with CBCT. Clinical and HST evaluation post-treatment after two weeks of acclimatization.

Results: Meta-analysis of conventional therapies compared with multi-variate regression analysis of 250 cases with AAVOAT: 1. Meta PAP: 41.1% did not acquire PAP therapy after Rx. Of 58.9% who did, 72.8% maintained therapy for 3 months and dropout rate was 27.2%. Of these 72.8%, 50% showed poor compliance. Thus, successful outcome of PAP was 21.44% of patients treated. 2. Meta OAT/COAT: Recent JCSM study: OAT/-COAT reduced AHI by 35-50% of all OSA. Independent OAT study reduced AHI by 75% in mild-moderate, and less than 50% in severe OSA. Compliance 75%. Overall success of 35%. 3. Meta Surgery: Hyoid suspension overall success 12%. HNS 44% patients had 68% AHI reduction, adherence 75%, overall success of HNS 22.44%. 4. N=250 AAVOAT: DX-AHIMEAN 24.2 (DX-AHIMAX 79.5), RX-AHIMEAN 2.2 (RX-AHIMAX 8), DX-LSATMEAN 83% (DX-LSATLOW 67%), P-value 0.19, adjusted R² 0.009, St. Err 0.012, t-stat 1.314, lower-95th% -0.008 and upper-95th% 0.039. Overall RX-AHI < 5 was 99.6%, compliance 96%. Overall success 95.61%. Regression Analysis forecast: RX-AHI = $1.7722 + [0.0155 * (DX-AHI)]$.

Conclusion: AAVOAT (Adaptive Antero-Vertical Open Airway Therapy) appears to be better than conventional non-invasive and surgical options for OSA. Unique AI-predictive flange/plateau design geometry successfully delivered breath-to-breath real-time demand-based optimization of airflow, irrespective of OSA severity or phenotype. AIO-AI-based approach to therapeutics can forecast successful OSA treatment with 99% accuracy. Will antero-vertical positioning and breath-to-breath adaptive airflow become the next gold standard for OSA treatment?

Support (if any): AIOMEGA

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0650

IMPACT OF COMORBID INSOMNIA AND SLEEP APNEA (COMISA) ON HYPOGLOSSAL NERVE STIMULATOR OUTCOMES

Amina Hamza, Michael Olson, Mithri Junna, Eric Olson,
Timothy Morgenthaler
Mayo Clinic, Rochester

Introduction: Hypoglossal nerve stimulation (HGNS) is an effective therapy for moderate-to-severe obstructive sleep apnea (OSA) in patients intolerant of positive airway pressure. Comorbid insomnia (COMISA) is common and may shape their engagement. Despite reports of improved insomnia symptoms, real-world data suggest reduced adherence and increased support needs. This study evaluated the impact of COMISA on HGNS therapy patterns and outcomes.

Methods: We conducted a retrospective cohort study of 46 adults with OSA who underwent HGNS implantation at Mayo Clinic Rochester between July 2020 and August 2025. Patients were categorized as OSA alone or COMISA based on pre-implantation data, including documented insomnia diagnosis, insomnia severity index score ≥ 15 , sleep initiation or maintenance complaints, hypnotic or melatonin use, participation in cognitive behavioral therapy for insomnia, or an insomnia care plan within one year prior to activation. We collected HGNS adherence metrics (30-day average nightly use, nightly pauses, percent nights used) at 1, 3, 6, and 12 months; non-visit HGNS-related clinical encounters at 6 and 12 months; and pre- and post-activation AHI from polysomnography or home sleep apnea testing. Longitudinal outcomes were analyzed using mixed-effects models with fixed effects for time and COMISA status and a random intercept for patient.

Results: The cohort was 54% male and 98% White, with median age 66 years and BMI 31 kg/m² (24–34). Median pre-implant AHI was 27 (19–40), and 30 patients (65%) had COMISA. Median nightly HGNS use declined from 7.8 to 6.6 hours from 1 to 12 months; mixed-effects modeling confirmed significant decreases over time ($p \leq 0.03$). Median nightly therapy pauses increased from 0.1 to 0.5, and median non-visit clinical encounters increased cumulatively from 2.5 at 6 months to 3.0 by 12 months (both $p \leq 0.01$). Median AHI reduction was 18.5 (2–27) ($p = 0.047$). There were no statistically significant differences between OSA-alone and COMISA groups in HGNS adherence trajectories, therapy pauses, support needs, or AHI improvement (all $p > 0.05$).

Conclusion: Although HGNS use declined modestly over time, COMISA was not statistically associated with differences in adherence, clinical support needs, or treatment response. Directional trends suggest greater adaptation challenges among patients with COMISA, warranting evaluation in larger prospective studies.

Support (if any):

Abstract citation ID: zsag091.0650

0651

NOT QUITE A REPLACEMENT: IMPACT OF HYPOGLOSSAL NERVE STIMULATOR (HNS) IMPLANT ON AHI REDUCTION

Karthy Thiagarajan¹, Mahathi Mudigonda², Sreelatha Naik²,
Kimberly Persaud Shewnarain²

¹Geisinger Sleep Medicine, ²Geisinger

Introduction: Hypoglossal nerve stimulation (HNS) is a salvage therapy recommended for patients who are intolerant of continuous positive airway pressure (CPAP). A prior meta-analysis noted 86% reduction in apnea hypopnea index (AHI) with CPAP use. Literature reviews evaluating HNS have reported 68% reduction in AHI in appropriately selected patients. The landmark study evaluating HNS defined treatment success as AHI reduction by 50% and to less than 20/hour. Our study evaluated the impact of HNS therapy in patients using the Sher 15 criteria.

Methods: A random sub-cohort of patients who underwent HNS implantation at a single institution between 2022 and 2024 was identified from retrospective chart review. Patients were included if age was over 18 years, AHI-4% was 15-100/hour and body mass index (BMI) was < 40 kg/m², in accordance with payer guidelines. In our study, treatment success was defined as an AHI reduction of 50 % or more from baseline with a treatment AHI less than 15/hour.

Results: 46 patients were identified from chart review for preliminary analysis of which 33 patients (71.7%) with pre and post procedure studies were included in the final statistical analyses. The average age of the included patients was 60.7 $\pm$ 9.19 years and 84.5% were male. The average pre-implantation BMI was 32.20 $\pm$ 3.67 kg/m², and average pre-treatment AHI-4% was 31.24 $\pm$ 16.15/hour. Overall, the average post-implantation AHI-4% was 17.12 $\pm$ 23.91/hour. 18/33 patients (54.55%) met treatment success by Sher 15 criteria. The post-surgical complication rate in our cohort was 18.18% and included swelling, bleeding, hematoma, post-nasal drip or dysarthria post procedure.

Conclusion: Our study noted treatment success in 54.55% of patients who underwent HNS therapy for treatment of OSA. Notably, 28.3% of patients did not have follow-up sleep testing during the study period after this invasive treatment modality. It is vital that referring clinicians and the patients undergoing HNS are aware of therapy success rates and the steps needed to evaluate success. Further data is needed on whether this threshold for success will lead to clinically meaningful outcomes with HNS such as improvement in snoring, daytime sleepiness, quality of life, bed-partner satisfaction, cardiovascular outcomes and mortality.

Support (if any):

Abstract citation ID: zsag091.0651

0652

INPATIENT SCREENING & MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA IN MEDICALLY ILL PATIENTS: A SYSTEMATIC REVIEW

Midila Bapineni, Naga Vamsi Krishna Machineni, Anjali Desai
Appalachian Regional Healthcare

Introduction: Obstructive Sleep Apnea (OSA) is prevalent and underdiagnosed in hospitalized adults. Untreated OSA may contribute to complications, including respiratory depression and cardiovascular events. The 2025 AASM guideline issued conditional recommendations for inpatient screening and PAP therapy. This review evaluates the impact of hospital based OSA screening and management on clinical outcomes.

Methods: We searched major databases published between 2010 and 2025, evaluating inpatient OSA screening and treatment. Inclusions criteria were randomized controlled trials (RCTs), cohort studies, and QI projects reporting outcomes such as mortality, length of stay (LOS), ICU transfers, and readmissions. Eight studies met inclusion criteria which included four QI projects, three retrospective cohorts, and one prospective cohort.

Results: STOP-Bang screening was feasible and identified high-risk patients (13–30% of admissions). A 5-year QI study (n=254,000) showed mortality reduction from 2.1% to 1.9% (p< 0.001) in patients monitored based on STOP-Bang score. However, screening alone did not reduce LOS or readmissions. In a cardiac unit study (n=1,981), STOP-Bang score did not predict readmission or LOS. A large cohort (n=3 million) found lower mortality in known OSA patients (aOR 0.71), but CPAP use during hospitalization was associated with higher mortality (aOR 1.51), likely due to confounding.

Conclusion: Inpatient OSA screening and monitoring may improve safety, particularly in high risk patients receiving sedatives. However, evidence for acute PAP therapy improving outcomes is limited. Further trials are needed to assess long-term benefits and cost-effectiveness.

Support (if any): Lauer A, Smith J, Patel R, et al. Implementation of STOP-Bang-based monitoring for hospitalized patients receiving sedatives: A quality improvement initiative across seven hospitals. *BMJ Open Qual.* 2024;13(1):e002345. doi:10.1136/bmjopen-2023-002345. Ogbu UC, Brown DL, Patel SR, et al. Association of obstructive sleep apnea and inpatient outcomes in acute cardiovascular admissions: Analysis of 3 million hospitalizations. *BMJ Open.* 2024;14(2):e067890. doi:10.1136/bmjopen-2023-067890.

Abstract citation ID: zsag091.0652

0653

INTEGRATION OF GLP-1 RECEPTOR AGONISTS INTO TREATMENT PROTOCOLS FOR OBSTRUCTIVE SLEEP APNEA

Kory Mack¹, Andrew Briggs¹, Tom O'Brien¹, Jean Manuel Prudon¹, Charles Gordon¹, Robyn van Poelgeest¹, Ofer Jacobowitz², Alan Schwartz³, Atul Malhotra⁴

¹LivaNova PLC, ²ENT and Allergy Associates, ³University of Pennsylvania, Perelman School of Medicine, ⁴UC San Diego Health

Introduction: GLP-1 Receptor Agonists (GLP-1RA) therapy is reshaping obstructive sleep apnea (OSA) treatment. As GLP-1RAs become more prevalent, their role within clinical care is important

to understand, whether first-line therapy or as a complementary tool. This research evaluates current GLP-1RAs usage in OSA and assesses the impact of these treatment patterns.

Methods: A 10-minute online survey was conducted in October 2025 among 50 ENTs and 100 Sleep Medicine Specialists (SMS). Respondents were required to have 2–30 years of post-residency experience, spend ≥75% of their time in direct patient care, and see patients that were actively on GLP-1RAs while also implanting or referring for Hypoglossal Nerve Stimulation (HGNS). In addition, we assessed GLP-1RA usage with Truveta's EHR data (120M patients, >30 health systems), including ~2.8M OSA diagnoses.

Results: Claims data show that 70% of the diagnosed OSA population is obese, driving a fast uptake in GLP-1RA usage. In addition, survey results indicate patients seeking treatment for OSA has increased over the past 6 months. SMS are utilizing GLP-1RAs in 29% of first-line OSA treatments. When CPAP is utilized as first-line, GLP-1RAs are also used in ~50% of patients as adjunct therapy. In our survey, 40% of physicians are still trialing GLP-1RAs with most planning to decide on adoption within 12 months. Survey respondents anticipate a short-term decrease in HGNS with a long-term net increase in implant volume. From claims data, the HGNS-BMI eligible patient population grew significantly post-GLP-1RA use.

Conclusion: Survey and claims data support that the majority of patients diagnosed with OSA live with obesity and are now prescribed with GLP-1RAs. Specialists report current or upcoming future use of GLP-1 RAs for people with obesity and sleep apnea. The findings suggest that GLP-1 RAs are currently disrupting traditional OSA treatment patterns, and that these medications may expand the total pool of patients seeking treatment for CPAP-alternatives, ultimately increasing the HGNS-BMI eligible population.

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0654

PERIODIC BREATHING AS A PREDICTOR OF FAILURE IN HOME CPAP TITRATION FOR OBSTRUCTIVE SLEEP APNEA

Gonzalo Labarca¹, Joaquín Nieto-Pino², Mario Henríquez-Beltrán³, Eva Retamal-Riquelme⁴, Daniel Solomons⁵,

Diana Pozuelo-Carrascosa², Arthur Eumann-Mesa², Robert Thomas⁶

¹Pontificia Universidad Católica de Chile, ²Universidad

Castilla-La Mancha, ³Universidad Adventista de Chillan,

⁴Hospital La Florida, ⁵Pontificia Universidad Católica de Chile,

⁶Beth Israel Deaconess Medical Center

Introduction: Periodic breathing (PB) is characterized by periods of respiratory instability and is commonly observed in patients with obstructive sleep apnea (OSA) in whom a high loop gain endotype predominates (i.e., an exaggerated ventilatory response to changes in ventilation). High levels of periodic breathing have previously been linked to CPAP failure using algorithms that detect PB from the nasal pressure signal during sleep studies. The aim of this study was to evaluate the association between periodic breathing and success or failure of home CPAP titration.

Methods: Materials and Methods This was a cross-sectional, retrospective study. We included adult patients diagnosed with OSA who were prescribed home titration with an auto-adjusting CPAP device (APAP; AirSense 10, ResMed) for three nights using a standard pressure range of 5–20 cm H₂O. The raw nasal pressure signal from the diagnostic polysomnography was exported in European

Data Format (EDF) and analyzed for periodic breathing using Spyder software (Python) version 5.5.1. The primary outcome was titration failure, defined as a residual apnea-hypopnea index (AHI) >10 events/hour and/or average CPAP use < 4 hours/night during the titration period.

Results: Results A total of 292 adults were included: 60% were male, median age was 56 years (IQR 48–65.8), median baseline AHI was 36.7 events/hour (IQR 24.8–61.5), and 14% had cardiovascular disease. Elevated periodic breathing ($\geq 20\%$ of total recording time) was independently associated with a higher likelihood of titration failure (adjusted OR 2.73; 95% CI 1.09–6.67; $p = 0.028$) after adjustment for age, body mass index, sex, OSA severity, cardiovascular disease, mask type, 95th percentile CPAP pressure, mask leak, and use of expiratory pressure relief.

Conclusion: Conclusions In this cohort, a high burden of periodic breathing was an independent predictor of failure during home CPAP titration. These findings support the concept that initial CPAP response is influenced by underlying physiological phenotypes and highlight periodic breathing as a valuable biomarker for personalizing treatment in patients with obstructive sleep apnea.

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0655

PROBABILISTIC ENSEMBLING OF PPG AND CPAP MODALITIES FOR SLEEP STAGE CLASSIFICATION

Hsin-Yu Chen¹, Hau-Tieng Wu², Cheng-Yao Chen³

¹PranaQ Pte. Ltd., ²Courant Institute of Mathematical Sciences, New York University, ³PranaQ, Co.

Introduction: Continuous Positive Airway Pressure (CPAP) therapy is the standard treatment for obstructive sleep apnea-hypopnea syndrome, and photoplethysmography (PPG) sensors are widely used in wearable devices. Both signal sources capture rich physiological patterns during sleep, including heart rate and respiratory dynamics. Combining these modalities may improve automatic sleep stage classification. Improved sleep stage accuracy can support a smoother titration process by supplying more precise information for optimizing pressure settings.

Methods: Separate 1D convolutional neural network models were trained for CPAP and PPG signals. PPG features included the PPG envelope, instantaneous heart rate (IHR), blood oxygen saturation (SpO₂), and actigraphy (ACTG). CPAP features included airflow, positive airway pressure (PAP), and instantaneous respiratory rate (IRR). Input sequences were segmented into 30-second epochs, and models were optimized using categorical cross-entropy loss with the Adam optimizer and early stopping. Predictions from both models were combined via probability-level ensembling using a weighted sum of softmax outputs, with weights selected on a validation set to maximize the macro-F1 score.

Results: The Duke University Hospital dataset (hereafter referred to as Duke) includes 36 subjects who underwent split-night polysomnography with CPAP titration using a ResMed S9 VPAP Tx device, while simultaneously wearing a fingertip PPG sensor (PranaQ TipTraQ). On this dataset, the PPG-based and CPAP-based models achieved overall macro-F1/Cohen's kappa scores of 0.669/0.497 and 0.585/0.384, respectively. The ensembled model improved the overall F1 and kappa to 0.696 and 0.531, with the best-case performance reaching F1 = 0.817 and $\kappa = 0.780$.

Conclusion: Integrating multiple physiological signal sources can complement each other, enhancing sleep stage detection accuracy and enabling more precise sleep monitoring.

Support (if any): None.

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0656

PSYCHOMETRIC VALIDATION OF THE PROMIS FATIGUE 8A, PROMIS SLEEP IMPAIRMENT 8A AND ESS IN ADULTS WITH MILD TO SEVERE OBSTRUCTIVE SLEEP APNEA

Kristina Yu¹, Shauna McManus², Zoey Du², Elizabeth Bush², Ashley Slagle³, Luigi Taranto-Montemurro¹, John Cronin¹, Brian Mangal¹, Ron Farkas¹

¹Apnimed, Inc., ²Open Health Group, ³Aspen Consulting, LLC

Introduction: AD109, an investigational oral combination therapy of the antimuscarinic, roxybutynin (2.5mg) with the selective norepinephrine reuptake inhibitor, atomoxetine (75mg), significantly improved objective measures of airway obstruction and oxygenation vs placebo (PBO) in two phase 3 clinical trials in obstructive sleep apnea (OSA). Patient-reported outcomes (PROs) were also assessed. This study aimed to expand the existing literature on their fit for purpose use in OSA by assessing the psychometric properties of the Patient Reported Outcome Measurement Information System (PROMIS) - Fatigue (F) 8a, PROMIS-Sleep Impairment (SI) 8a, and Epworth Sleepiness Scale (ESS) in the AD109 Phase 3 trials.

Methods: Analyses were conducted using SynAIRgy (NCT05813275; N=646) and LunAIRo (NCT0811247; N=660) randomized, double-blind, PBO-controlled, parallel-arm phase 3 trials of AD109 vs PBO in adults with mild-to-severe OSA (AHI>5) intolerant to or refusing positive airway pressure (PAP) therapy. PROs included PROMIS-F 8a, PROMIS-SI 8a, ESS, Patient Global Impression of Severity-Fatigue (PGI-S) and Patient Global Impression of Change-Fatigue (PGI-C). Psychometric analyses included internal consistency, test-retest reliability (TRTR), convergent and known-groups validity, responsiveness to change and meaningful within-patient change (MWPC) thresholds.

Results: Reliability of all three PROs was evidenced by excellent internal consistency, with McDonald's ω and Cronbach's α estimates consistently exceeding acceptable thresholds (> 0.70). TRTR was consistently moderate to strong, particularly when stability was defined with PGI- anchors of fatigue (intraclass correlation coefficients > 0.70). Convergent validity was supported by strong correlations with conceptually related measures with all correlations meeting or exceeding predefined thresholds. Known-groups validity analyses supported the ability to differentiate levels of symptoms severity across PGI-S responses, and correlations of change over time demonstrated that each PRO is sensitive to detect change at week 26. Anchor-based analyses of clinically MWPC improvement thresholds were - 8.40 (supplementary range, 6.0 to -9.0) for PROMIS-F 8a T-score; -9.0 (-7.5 to -10.0) for PROMIS-SI 8a T-score; and -2.0 (-2.0 to -3.0) for ESS in the OSA population.

Conclusion: PROMIS-Fatigue 8a, PROMIS-SI 8a and ESS are reliable and valid measures of OSA-related symptoms, confirming their fitness for the purpose of supporting clinical trial endpoints in the OSA population, in accordance with the FDA PRO guidance.

Support (if any): Apnimed, Inc.

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0657

SEDATIVE-HYPNOTIC THERAPY IN CENTRAL SLEEP APNEA (CSA): A SYSTEMATIC REVIEWMidilla Bapineni¹, Naga Vamsi Krishna Machineni¹, Shivendra Tangutoori¹, Maneesh Gaddam²¹Appalachian Regional Healthcare, ²Hazard ARH Regional Medical Center

Introduction: Central sleep apnea (CSA) is characterized by diminished or absent ventilatory effort during sleep, often resulting in fragmented sleep and daytime symptoms. While standard therapies (e.g., CPAP, ASV, supplemental oxygen) show variable effectiveness, sedative-hypnotics such as zolpidem may stabilize respiration by reducing arousals and increasing partial pressure of arterial carbon dioxide. However, the 2025 AASM guideline made no recommendation due to insufficient evidence. This review evaluates the efficacy and safety of hypnotics in CSA.

Methods: We searched major databases for studies published between 2000 and 2025, evaluating sedative-hypnotics in adult CSA. Inclusion criteria were randomized controlled trials (RCTs), observational studies, and case series reporting apnea-hypopnea index (AHI), central AHI (CAHI), sleep continuity, and adverse effects. Five studies met the inclusion criteria: one crossover RCT, two case series, and two case reports. Outcomes were synthesized qualitatively.

Results: All studies reported reductions in central apnea frequency and improved sleep continuity. In a 20-patient case series, zolpidem reduced CAHI from 26.0 to 7.1 ($p < 0.001$), AHI from 30.0 to 13.5 ($p = 0.001$), and arousal index from 24.0 to 15.1 ($p < 0.001$), with Epworth Sleepiness Scale (ESS) scores improving from 13 to 8. A crossover RCT ($n = 11$) showed zolpidem reduced respiratory arousal index (39.7/h to 23.3/h, $p = 0.031$) and AHI (55.6 to 41.3/h, $p = 0.033$). No significant changes in carbon dioxide reserve or arousal threshold were observed. Three patients developed emergent obstructive events, and no major adverse effects were reported.

Conclusion: Sedative-hypnotics may reduce central apneas and improve sleep quality in CSA, particularly in idiopathic cases. However, the risk of emergent obstructive events and the lack of long-term data limit generalizability. Larger RCTs are needed to confirm efficacy and safety across CSA subtypes.

Support (if any): Quadri S, Berry RB, Patel S, et al. Zolpidem for treatment of idiopathic central sleep apnea: An open-label trial. *J Clin Sleep Med.* 2009;5(6):529-534. Ahmad B, Sankari A, Eshraghi M, et al. Effect of Zolpidem on nocturnal arousals and susceptibility to central sleep apnea. *Sleep Breath.* 2023;27(1):173-180. doi:10.1007/s11325-022-02593-3

Abstract citation ID: zsag091.0657

0658

TOTAL INTRAVENOUS ANESTHESIA VERSUS INHALED ANESTHETICS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEWHugo Silva-Contreras¹, Brenda Cunningham², Panaiyappan Arunachalam³, Sushmitha Asaithambi³, Edgar Morales Septien⁴, Judith Marcela Idrovo Molina⁵, Jawad Mchaik⁶, Elisa M. Ortiz Santiago⁷, Viridiana Yumiko Nakamura Ramirez⁸, Pietro Bazan McKenzie⁹, Maria Alejandra Hernandez¹⁰, Omar A. Borges-Sosa¹¹, Ernesto Calderon Martinez¹²¹Universidad Autónoma de Baja California, ²Universidad Anahuac, ³Yerevan Haybusak University, ⁴Tecnologico de Monterrey, ⁵Universidad de Guayaquil, ⁶Caucasus International University, ⁷Medical University of the Americas, ⁸Universidad Nacional Autonoma de Mexico, ⁹Universidad Villa Rica, ¹⁰Universidad de Buenos Aires, ¹¹Indiana University, ¹²University of Texas Health Science Center at Houston

Introduction: Obstructive Sleep Apnea (OSA) increases the risk of perioperative respiratory and cardiovascular complications, making anesthetic selection crucial for patient safety. Both total intravenous anesthesia (TIVA) and inhalational anesthesia are used in patients with OSA, but their perioperative outcomes remain uncertain. This systematic review aimed to evaluate the efficacy and safety of TIVA compared with inhalational anesthesia for patients with OSA.

Methods: Following PRISMA 2020 guidelines, a comprehensive search was performed across PubMed, MEDLINE, Web of Science, CINAHL, Cochrane Library, and Google Scholar through October 2025. Primary outcomes were postoperative respiratory complications. Secondary outcomes included extubation time, post-anesthesia care unit (PACU) length of stay, postoperative nausea and vomiting (PONV), and 30-day morbidity or mortality. Meta-analysis was intended to be conducted using R software under a random-effects model, and the risk of bias was assessed using RoB 2.0 and ROBINS-I tools.

Results: A total of 266 records were identified through database searches. After screening and eligibility assessment, four studies met inclusion criteria, encompassing 631 participants in total. All studies were conducted between 2019 and 2020 at a single tertiary academic center in the United States. Because all eligible studies were conducted at the same institution and time frame, involving potentially overlapping patient populations, a quantitative meta-analysis was not performed to avoid double counting. Instead, findings were synthesized qualitatively. The studies included one randomized controlled trial and three retrospective comparative cohort studies. Across studies, mean age ranged 55.4 ± 12.1 to 56.2 ± 12.4 years and BMI from 29.7 ± 4.3 to 29.8 ± 3.6 kg/m². Overall, 75% of the studies reported a significant reduction in Phase I or total recovery time with total intravenous anesthesia (TIVA) compared with inhalational anesthesia, while one study (25%) found no statistically significant difference. No other significant differences were found.

Conclusion: TIVA provides comparable safety and faster postoperative recovery than inhalational anesthesia in adults with OSA, without increasing respiratory complications or PONV. These findings support TIVA as a viable anesthetic approach for OSA patients, particularly in upper airway surgeries where postoperative airway control is critical. Further randomized trials with standardized outcomes are warranted to confirm the results and strengthen recommendations.

Support (if any):

Abstract citation ID: zsag091.0658

0659

EPAP ENHANCED ORAL APPLIANCE THERAPY IS SUCCESSFUL IN TREATING SEVERE OBSTRUCTIVE SLEEP APNEA (OSA)Sat Sharma¹, Hilary Reiter¹, Antonella Conflitti²¹Centre for Sleep and Chronobiology, ²Windsor Sleep Disorders Clinic

Introduction: Oral Appliances (OA) are a primary therapy option for mild to moderate OSA patients and for severe OSA patients who are continuous positive airway pressure (CPAP) intolerant. However, there is a paucity of published data for efficacy of OA in severe OSA. A novel oral appliance, O2Vent Optima incorporates both the mandibular advancement and an air channel that allows airflow through the device to circumvent nasopharyngeal obstruction. The ExVent is an accessory to the mandibular advancement device and provides oral Expiratory Positive Airway Pressure (EPAP). Previous studies have established efficacy of the air channel and EPAP of the combination therapy in the treatment of mild to moderate OSA. Study purpose was to assess the efficacy of the EPAP enhanced novel OA in the treatment of severe OSA patients who were either CPAP intolerant or preferred other therapies.

Methods: A prospective, open-label study conducted at multiple sites included 36 patients with severe OSA (AHI > 30/hr.). Average age: 58.45 ± 6.86 years; mean BMI: 34.16 ± 8.2; 74% were men. A diagnostic in-lab PSG study was initially performed to confirm a diagnosis of severe OSA. Patients who were CPAP intolerant or preferred OA were approached for study participation and informed consent was obtained. The enrolled patients were evaluated, custom fitted with the EPAP enhanced novel OA and adjustments were clinically guided. The participants used the combination therapy >80% of the nights for >12-week period; compliance was verified. Primary Efficacy Measure: Change in AHI between baseline vs. EPAP enhanced OA. Secondary Efficacy Measures: Treatment success (% of patients with a ≥50% decrease in AHI from baseline); improvement in lowest oxygenation saturation (SpO2 nadir).

Results: Treatment with the EPAP enhanced OA reduced AHI from 45.43 ± 11.23/hr. to 13.44 ± 6.34/hr. ($p < 0.005$), average 76% reduction in AHI. The lowest oxygen saturation (SpO2 nadir) during sleep increased from 80.82 ± 6.2% to 89.54 ± 1.25% ($p < 0.005$). Treatment success rate was 84%.

Conclusion: Oral Appliance therapy offers an alternative treatment solution for patients with severe obstructive sleep apnea who are intolerant or refuse CPAP therapy; however, the data is limited. Our study demonstrated successful treatment of patients with severe obstructive sleep apnea with the novel EPAP enhanced Oral Appliance.

Support (if any): None

Abstract citation ID: zstag091.0659

0660

TREATMENT OF OBSTRUCTIVE SLEEP APNEA USING A LINGUAL-LESS DESIGN ORAL APPLIANCE: AN INTERIM, RETROSPECTIVE ANALYSIS

Xzavier Ozuna LaFollette, Kent Smith
Star Sleep & Wellness

Introduction: Oral appliance therapy (OAT) is commonly used to treat obstructive sleep apnea (OSA), yet real-world outcomes are frequently summarized using apnea-hypopnea index (AHI) alone. Sleep apnea-specific hypoxic burden (HB), a metric that is predictive of OSA-associated risk, may provide complementary information regarding physiologic impact. We evaluated patient-level changes in AHI and HB using paired baseline and post-treatment home sleep apnea tests following treatment with a novel, lingual-less precision oral appliance.

Methods: This retrospective chart review included patients treated with an EVO Guided oral appliance (ProSomnus Sleep Technologies, Pleasanton, CA), a new precision oral appliance with a lingual-less design. Patients with both a baseline and post-OAT Type III home sleep apnea test (HSAT). were included in the analysis. HSATs were interpreted by qualified clinicians (sleep physician and/or dentist, per local practice). For patients with multiple baseline and/or post study nights, values were averaged to generate one baseline and one post value per patient. Outcomes included AHI and HB. Analyses were summarized for all patients and by baseline severity (moderate, severe). Paired t-tests were performed for the full cohort.

Results: Twenty-one patients had paired baseline and post-OAT HSATs. For all patients, the mean AHI decreased from 21.0 ± 10.1 to 13.6 ± 6.7 events/hour, with a mean percent change of -29.51% (SD 0.4; $p < 0.001$). Mean HB decreased from 30.6 ± 18.2 to 16.5 ± 12.7 %min/hour, with a mean percent change of -41.62% (SD 0.3; $p = 0.00036$). In patients with moderate OSA ($n = 9$), the mean percent change was -36.72% for AHI and -52.39% for HB. In patients with severe OSA ($n = 6$), the mean percent change was -56.93% for AHI (3%) and -56.46% for HB.

Conclusion: In this real-world retrospective cohort, OAT was associated with significant reductions in both AHI and sleep apnea-specific hypoxic burden, with larger average improvements observed in patients with severe OSA. The reductions in AHI and HB are of particular interest because they reflect only the interim assessment of the device, not its true efficacy. Additional patient follow-up is needed to optimize therapeutic efficacy.

Support (if any):

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0661

UPPER AIRWAY STIMULATION FOR OBSTRUCTIVE SLEEP APNEA: TREATMENT OUTCOMES BY SLEEP POSITION AND SEX

Alexis Shindhelm¹, Alan Tesson², Emily Commesso¹,
Shakthi Unnithan¹, Russel Kahmke¹, Matthew Ellison¹,
Stephen Gliske³, Rodney Radtke¹

¹Duke University School of Medicine, ²INOVA Health Systems,

³University of Nebraska Medical Center

Introduction: Obstructive sleep apnea (OSA) severity varies by sleep position and sex; however, it is not known whether these factors affect how well upper airway stimulation by hypoglossal nerve stimulation (HGNS) controls OSA. In our clinical practice, we have observed that patients often were more responsive to control of OSA with HGNS in the lateral compared to supine sleep position.

Methods: Our study examines HGNS control of OSA by sleep position, supine versus lateral, and sex. To enhance real-world clinical applicability of results and address concerns regarding appropriate postoperative sleep study criteria to evaluate HGNS outcomes, our study also proposes and utilizes a standardized positional HGNS titration study scoring protocol to assess apnea-hypopnea index (AHI). A retrospective cohort of adult patients was implanted with HGNS at a tertiary care center between January 2018 and June 2021. Outcome measures included surgical response rate by sleep position and sex using Sher criteria (reduction of AHI by at least 50% to < 20/hr) and normalization of AHI (< 5/hr).

Results: Of 181 patients implanted, 113 patients met inclusion criteria with preoperative and postoperative sleep studies with

positional data. Patients were primarily older (63.8 $\pm$ 9.7 years), overweight (BMI 29.1 $\pm$ 3.5), white (91.2%) males (67.3%) with severe OSA (median AHI 32.0). HGNS success by Sher criteria (or normalization of AHI) in lateral sleep was 77.0% (54.1%) compared to 52.9% (23.5%) in supine sleep. Females attained a greater supine AHI reduction and surgical response rate than males ($p < 0.05$). In supplemental analyses, positional trends persisted even when patients who underwent multiple titration or postoperative sleep studies were excluded. Subgroup analyses for patients with full-night fixed-voltage sleep studies were limited by low counts.

Conclusion: Thus, our study demonstrated that HGNS therapy more effectively controls OSA for patients in the lateral sleep position and for females, especially in the supine position. Our findings suggest clinically meaningful differences by sleep position that may help patients with a preferred sleep position or a position-dominant type of apnea make more informed decisions when considering HGNS therapy over traditional sleep apnea therapies.

Support (if any):

Abstract citation ID: zsa091.0661

0662

A DIRECT REFERRAL PATHWAY TO IMPROVE POST-STROKE EVALUATION OF OBSTRUCTIVE SLEEP APNEA

Kyrillos Ghattas¹, Zhikui Wei²

¹Thomas Jefferson University Hospital, Jefferson Sleep Disorders Center and Department of Psychiatry, ²Thomas Jefferson University Hospital, Jefferson Sleep Disorders Center and Department of Neurology

Introduction: Stroke is a leading cause of death and disability, affecting nearly 800,000 individuals annually in the US. Obstructive sleep apnea (OSA) is a prevalent comorbidity among stroke survivors, contributing to worse cognitive and functional outcomes. Despite its importance, OSA is underdiagnosed and undertreated after stroke. Most patients rely on traditional outpatient referrals from stroke neurologists or primary care physicians to sleep specialists, a pathway that often results in significant delay. This study evaluates the feasibility and early outcomes of an alternative direct referral pathway to expedite OSA assessment and management after stroke.

Methods: We implemented a direct referral (DR) pathway allowing stroke neurologists at Thomas Jefferson University Hospital to order sleep studies directly for outpatient stroke/TIA patients at risk for OSA, while the traditional referral (TR) pathway to sleep specialists remained available. Demographic and clinical data were collected for patients referred through either pathway between 12/1/2023 and 11/30/2025. Primary outcomes included initial patient retention, time to study completion, study completion rate, and OSA severity. Between-group differences were analyzed using Student's t-tests and chi-square tests.

Results: A total of 180 patients were included (TR: 88; DR: 92). Groups were similar in age (65.1 $\pm$ 11.3 vs 66.2 $\pm$ 8.8, $p = 0.48$), sex (48% vs 53% female, $p = 0.46$), race/ethnicity (White [51%] vs [59%], $p = 0.39$), BMI (31.8 $\pm$ 7.2 vs 31.4 $\pm$ 6.0, $p = 0.69$), and mean AHI/REI (18.5 $\pm$ 13.9 vs 22.5 $\pm$ 20.1, $p = 0.33$). The DR pathway improved initial patient retention (62% vs. 32%, $p = 0.00005$) and reduced time to study completion (5 $\pm$ 4 weeks vs. 13 $\pm$ 8 weeks, $p = 0.0003$). Study type differed (TR: 61% HSAT, 32% PSG, 7% deferred;

DR: 89% HSAT, 11% PSG, $p = 0.0006$). Sleep study completion rates were higher in the TR group (85% vs. 62%, $p = 0.03$).

Conclusion: The DR pathway for post-stroke OSA evaluation is feasible and substantially improves initial patient retention while markedly reducing time to study completion. It is associated with greater reliance on HSAT and lower study completion rates. Future studies should identify barriers to study completion and assess downstream outcomes in patients referred through the DR pathway.

Support (if any):

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0663

CONTENT VALIDITY AND MEANINGFUL CHANGE ON PATIENT-REPORTED OUTCOME MEASURES FOR USE IN OBSTRUCTIVE SLEEP APNEA

Joseph Ojile¹, Kristina Yu², Ron Farkas², Hilary Colwell³, Susan Mathias³, John Cronin²

¹Clayton Sleep Institute, LLC, ²Apnimed, Inc., ³Health Outcomes Solutions

Introduction: SynAIRgy (NCT05813275) was a randomized, double-blind, placebo-controlled, 26-week, parallel-arm Phase 3 trial of AD109 vs placebo in adults with mild-to-severe obstructive sleep apnea (OSA). Patient-reported outcomes (PROs) were among the assessed endpoints. This research sought to determine what participants perceive as meaningful change on the PROs and obtain evidence of their content validity.

Methods: Qualitative interviews via video conferencing were conducted with 32 participants within 3 days of completing SynAIRgy. PRO endpoints, including the PROMIS-Fatigue-8a (5 response categories), PROMIS-Sleep Impairment-8a (5 categories), Epworth Sleepiness Scale (ESS) (4 categories), Patient Global Impression of Severity (PGI-S) for Fatigue (5 categories), and Patient Global Impression of Change (PGI-C) for Fatigue (5 categories) were evaluated. During the concept elicitation (CE) portion of the interview, participants were asked questions exploring symptoms and disease impact. Number of categories of change deemed to be meaningful were also assessed. Concepts identified during the CE portion of the interview were mapped to each PRO to evaluate content validity. Analysis was conducted using qualitative software (MAXQDA). The study received IRB approval; participants provided informed consent.

Results: The majority of participants reported a one-point change on individual items from the PROMIS-Fatigue (61%-96%), PROMIS-Sleep Impairment (52%-96%), and ESS (62%-96%) as meaningful regardless of baseline response. 68%-100% stated a one-point change on the PGI-S would be meaningful; 83% found a change on the PGI-C of "a little better" to be meaningful. Mapping demonstrated that all PROs have strong concept coverage. Specifically, PROMIS-Fatigue, PGI-S, and PGI-C assess the concept of feeling fatigue/tired; all participants reported fatigue. PROMIS-Sleep Impairment assesses sleepiness, poor sleep, feeling alert upon waking, and feeling tired (88% had trouble sleeping/falling asleep/waking up, 66% reported daytime sleepiness, 50% reported not feeling rested upon awakening, and 100% reported feeling fatigue/tired). ESS assesses sleepiness in various situations; 66% reported daytime sleepiness.

Conclusion: This research confirmed robust concept coverage across all PROs for participants with OSA. Notably, a one-point

change on the PROs represents a clinically meaningful improvement from the patient's perspective. Establishing thresholds for meaningful change provides context for interpreting clinical significance for the PROs in OSA longitudinal studies.

Support (if any): This research was supported by Apnimed, Inc.

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0664

DELAYS IN HELP-SEEKING IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA (OSA): A QUALITATIVE STUDY

Fateme Asadollah¹, Sanjay Patel², Faith Luyster³, Jonna Morris¹

¹University of Pittsburgh, ²Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ³University of Pittsburgh School of Nursing

Introduction: Delays in seeking help and initiating treatment for obstructive sleep apnea (OSA) remain major barriers to timely diagnosis and improved outcomes for patients. This qualitative study examined patient experiences prior to OSA diagnosis with a focus on identifying factors that delayed diagnosis and treatment initiation as well as motivators that ultimately encourage patients to seek diagnosis.

Methods: In the parent study, thirty-five semi-structured telephone interviews with broad and open-ended questions were conducted to improve understanding of sex differences in OSA symptom presentation prior to diagnosis. For the current study, we examined those same patients' experiences of the diagnostic process and their acceptance of treatment. The data were analyzed by two independent reviewers using a thematic approach and pattern coding. Any disagreements were resolved through consensus with the principal investigator.

Results: Participants (N=35; mean age=54±14 years; 54.3% male, 45.7% female; 71.4% White, 28.6% African American) described two overarching themes: Delay in Diagnosis and Delay in Treatment Initiation, each containing several subthemes. In describing the Delay in Diagnosis which has four subthemes, participants routinely; 1) misattributed their symptoms to stress, chronic health conditions, or lifestyle factors. 2) Many also described minimizing their symptoms, often prioritizing work or family responsibilities over seeking care. 3) Denial was also common; several participants reported that they "knew something was wrong" yet were not willing to accept it. 4) Motivators that eventually pushed them to seek care included frightening episodes of gasping or choking, concerns expressed by partners or family members who witnessed breathing pauses, and, for some, stigma related to loud snoring. The Delay in Treatment Initiation was characterized by two subthemes in which participants were aware of their OSA diagnosis for years but did not initiate treatment since they were in 1) denial in accepting the diagnosis. 2) Some described postponing treatment because they did not see it as an immediate threat, seeking care only after their condition worsened.

Conclusion: Patients experience delays in acknowledging their symptoms, seeking care, and starting treatment. Improving public awareness, case-finding, and addressing patients' psychological

barriers and providing follow-up support to initiate treatment, may improve OSA outcomes by providing earlier treatment.

Support (if any):

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0665

EFFECTS OF DAILY INTERMITTENT HYPERCAPNIA ON SLEEP QUALITY IN VETERANS WITH SLEEP-DISORDERED BREATHING

Moustafa Habra¹, Dana Sunbuli¹, Laith Amona², Maria Fatima², Raya Nashef¹, Mohamed Nasry², Nishtha Pandya², Ismael Rathur², Sami Rifai², Stuti Shankar¹, M. Safwan Badr², Abdulghani Sankari²

¹Detroit John D. Dingell VA Medical Center, ²Wayne State University

Introduction: Sleep-disordered breathing (SDB) is common among individuals with spinal cord injury or disease (SCI/D), contributing to impaired sleep quality and breathing instability. Traditional treatments using mechanical devices have not been well adhered to or tolerated. While novel therapeutic interventions and chemical stimulation using acute intermittent isocapnic hypoxia have been shown to enhance ventilatory plasticity, the effects of intermittent hypercapnia on sleep quality have not been investigated. This study evaluated whether daily acute intermittent hypercapnia (dAIHc) is feasible and whether it influences sleep quality and sleep-related respiratory stability in Veterans with SDB.

Methods: Veterans with SDB (AHI >5 events/hr), with and without SCI/D, completed a two-week dAIHc protocol. dAIHc consisted of 10 cycles of 3-minute isooxic hypercapnia (21% O₂, 5% CO₂) alternating with 5 minutes of room air, administered 5 days per week. Sleep quality was assessed before and after the intervention using the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Fatigue Severity Scale (FSS), and Insomnia Severity Index (ISI). The severity for SDB was assessed before and after dAIHc using full polysomnography (using Nox A1™, including changes in total AHI, and AHI 3%). Paired t-test was used to compare outcome measures before and after the dAIHc.

Results: A total of 15 Veterans with SDB completed the protocol. Participants had a mean age of 58.1 ± 11.7 years with a mean BMI of 32.5 ± 6.3, were all male, and included both SCI/D (n=9) and able-bodied (n=6) participants. Across participants who completed both baseline and post-intervention assessments, dAIHc was associated with a significant improvement with AHI 3% and ISI. Mean AHI 3% decreased from 39.0 ± 22.7 to 23.2 ± 19.7 events/hour (p = 0.01) and ISI showed a significant reduction from 11.1 ± 7.0 to 6.3 ± 4.7 (p < 0.05). No significant change was noted in ESS, PSQI, or FSS (p=NS).

Conclusion: The findings show that dAIHc is a feasible intervention for Veterans with SDB, leading to significant improvements in SDB severity and insomnia symptoms. These results suggest dAIHc intervention as promising to treat SDB and improve sleep quality in this population, including those with SCI/D. Further research with larger samples is needed to confirm this.

Support (if any):

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0666

EFFICACY, TOLERABILITY, AND SAFETY OF PITOLISANT FOR RESIDUAL SLEEPINESS IN OBSTRUCTIVE SLEEP APNEA TREATED WITH CPAPStanley Wong¹, Jason Baek¹, Melanie Zhang¹, Nicholas Fabiano², Carl Zhou², Elliot K. Lee², Marco Solmi², Ishrat Husain¹, Michael Mak¹¹University of Toronto, ²University of Ottawa

Introduction: To systematically review and meta-analyze the efficacy, tolerability, and safety of pitolisant for the treatment of residual excessive daytime sleepiness (EDS) in adults with obstructive sleep apnea (OSA) treated with continuous positive airway pressure (CPAP).

Methods: Systematic review (MEDLINE/EMBASE/-Cochrane/psycINFO/clinical trial registries, 01/02/2025) of randomized controlled trials (RCTs) comparing pitolisant to placebo in adults with OSA and residual EDS despite CPAP use. The primary outcome was change in subjective sleepiness measured on any validated scale. Secondary outcomes included all-cause discontinuation and treatment-emergent adverse events (TEAEs). A random-effects model was used to calculate standardized mean differences (SMDs) and pooled Log risk ratios (Log RRs) with 95% confidence intervals (CI). Risk of bias was assessed with Cochrane RoB2. Certainty of evidence was assessed with GRADE.

Results: Three RCTs (N = 721) were included. Pitolisant significantly reduced Epworth Sleepiness Scale scores (SMD = -0.90, 95% CI = -1.29 to -0.50; moderate certainty). There were no significant differences between pitolisant and placebo for all-cause discontinuation (Log RR = 0.76, 95% CI = 0.25 to 2.34; low certainty) or TEAEs (Log RR = 1.04, 95% CI = 0.83 to 1.31; low certainty). The most common adverse events reported while using pitolisant were headache and insomnia.

Conclusion: Pitolisant is an effective and well-tolerated treatment for reducing subjective EDS in patients with OSA on CPAP therapy. These findings support its potential as a therapeutic option in this population. Future studies should include larger sample sizes and objective measures of sleepiness.

Support (if any):

Abstract citation ID: zsag091.0666

0667

ENHANCING CONTINUITY OF CARE: PAP PROVISION AT DISCHARGE FOR PATIENTS DIAGNOSED WITH OBSTRUCTIVE SLEEP APNEAOmar Srouf, Tamara Jordan, Rehab Talat, Miriam Jaziri, Luisa Bazan
Henry Ford Hospital

Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder linked to significant cardiovascular, metabolic, and neurocognitive complications. Positive airway pressure (PAP) therapy is the standard treatment, but many patients diagnosed during hospitalization are discharged without timely PAP initiation, creating gaps in care and delaying therapy. Ensuring PAP provision at discharge is essential for improving access, adherence, and continuity of care. This quality improvement project evaluates current discharge practices for hospitalized patients diagnosed

with OSA and aims to identify opportunities to increase appropriate PAP provision at discharge.

Methods: We conducted a retrospective chart review of 705 adult patients admitted to Henry Ford Hospital from January 2015 to September 2025 who received an inpatient sleep medicine consultation. Electronic medical records were reviewed to determine whether PAP therapy was prescribed and delivered at discharge. Data collected included demographics, method of diagnosis, discharge disposition, and documentation of PAP initiation or equipment orders. PAP provision rates were calculated as the proportion of eligible patients receiving PAP prior to discharge.

Results: Among 705 patients reviewed, 283 were diagnosed with OSA. Of these, 188 (66.4%) received PAP equipment at discharge and 95 (33.6%) did not. The absence of documented PAP initiation in one-third of eligible patients highlights variability in inpatient prescribing practices and missed opportunities for timely therapy initiation.

Conclusion: Only two-thirds of hospitalized patients diagnosed with OSA received PAP equipment prior to discharge, revealing a significant gap in care and opportunity to strengthen inpatient initiation of therapy. Improving PAP provision rates will require a more systematic approach, including early sleep medicine consultation, streamlined EMR-based PAP ordering workflows, coordination with primary teams, and enhanced education for both patients and clinical staff. Implementing these strategies may enhance therapy initiation, adherence, and continuity of care for hospitalized patients with OSA.

Support (if any):

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0668

EVALUATION AND MANAGEMENT OF OSA IN ADULTS HOSPITALIZED FOR MEDICAL CARE: AN AMERICAN ACADEMY OF SLEEP MEDICINE CLINICAL PRACTICE GUIDELINEReena Mehra¹, Dennis Auckley², Karin Johnson³, Martha Billings¹, Gerard Carandang⁴, Yngve Falck-Ytter², Rami Khayat⁵, Reem Mustafa⁶, Cinthya Pena-Orbea⁷, Ashima Sahni⁸, Sunil Sharma⁹, Susheel Patil¹⁰¹University of Washington, ²Case Western Reserve University, ³UMass Chan Medical School - Baystate, ⁴American Academy of Sleep Medicine, ⁵Penn State University, ⁶University of Kansas Medical Center, ⁷Cleveland Clinic, ⁸University of Illinois at Chicago, ⁹West Virginia University, ¹⁰University Hospitals of Cleveland

Introduction: This guideline establishes clinical practice recommendations for the management of obstructive sleep apnea (OSA) in medically hospitalized adults.

Methods: The American Academy of Sleep Medicine (AASM) commissioned a task force of experts in sleep medicine to develop recommendations and assign strengths based on a systematic review of the literature and an assessment of the evidence using Grading of Recommendations, Assessment, Development and Evaluation methodology. The task force provided a summary of the relevant literature and the certainty of evidence, the balance of benefits and harms, patient values and preferences, and resource use considerations that support the recommendations. The AASM Board of Directors approved the final recommendations.

Results: Good Practice Statement: The following good practice statement is based on expert consensus, and its implementation is necessary for the appropriate and effective management of

hospitalized adults with sleep-disordered breathing: For medically hospitalized adults with an established diagnosis of sleep-disordered breathing and on active treatment, existing treatment should be continued rather than withheld, unless contraindicated. Recommendations: The following recommendations are intended as a guide for clinicians in managing medically hospitalized adults with OSA. Each recommendation statement is assigned a strength ("Strong" or "Conditional"). A "Strong" recommendation (i.e., "We recommend...") is one that clinicians should follow under most circumstances. A "conditional" recommendation (i.e., "We suggest...") is one that requires that the clinician use clinical knowledge and experience and strongly consider the patient's values and preferences to determine the best course of action.

Conclusion: 1. For medically hospitalized adults at increased risk for OSA, the AASM suggests in-hospital screening for OSA as part of an evaluation and management pathway that incorporates diagnosis and treatment with positive airway pressure rather than no in-hospital screening. (Conditional recommendation, low certainty of evidence) Remarks: Screening may include validated questionnaires and/or screening with overnight high-resolution pulse oximetry (HRPO). When considering in-hospital screening as part of a management pathway, 1) patients who place a lower value on the potential reduction of clinically meaningful outcomes (e.g., cardiovascular events) and place a higher value on the possible downsides associated with the use of positive airway pressure (PAP) (e.g., sleep disruption, discomfort), or 2) clinicians who perceive that the diagnosis or management of OSA may interfere with medical care, would reasonably decline OSA screening or PAP during the hospitalization. High risk for OSA is defined by signs and symptoms that suggest moderate to severe OSA (e.g., excessive daytime somnolence + 2 of the following: diagnosed hypertension; habitual loud snoring; witnessed apnea, gasping, or choking and/or association of high-risk comorbidities as outlined in the Figure 1 caption). Diagnostic testing for OSA should ideally be conducted after a patient has been medically stabilized during the hospital stay or post-discharge. 2. For medically hospitalized adults with newly diagnosed OSA, or with a prior established diagnosis of moderate-to-severe OSA but not currently on treatment, the AASM suggests the use of inpatient treatment with PAP rather than no PAP. (Conditional recommendation, low certainty of evidence) Remarks: When considering in-hospital OSA treatment, 1) patients who place a lower value on the potential reduction of clinically meaningful outcomes (e.g., cardiovascular events) and place a higher value on the possible downsides associated with the use of PAP (e.g., sleep disruption, discomfort), or 2) clinicians who perceive that the diagnosis or management of OSA may interfere with medical care, would reasonably decline OSA screening or PAP during the hospitalization. 3. For medically hospitalized adults at increased risk for or with an established diagnosis of OSA, the AASM suggests that sleep medicine consultation be available as part of an evaluation and management pathway, rather than no sleep medicine consultation. (Conditional recommendation, very low certainty of evidence) Remarks: It is recognized that there will be variability of the availability of hospital-based expertise and resources specific to sleep medicine consultation; therefore, we provide specific guidance as follows. Oversight by a board-certified sleep medicine clinician and/or an AASM-accredited sleep center is preferable. However, elements of this consultation including education and follow-up plan can be provided by those with requisite expertise including advanced practitioners, nurses, sleep technologists,

respiratory therapists, care coordinators, case managers, health educators, or other available resource personnel. Given the variability of expertise and resources available, creative consultation models of care such as teleconsult/telehealth, E-consult and/or nursing or respiratory therapist care can be considered. Availability of inpatient diagnostics and treatment as part of the consultation should be taken into consideration in terms of feasibility of implementation of this recommendation. 4. For medically hospitalized adults at increased risk for or with an established diagnosis of OSA, the AASM suggests a discharge management plan to ensure timely diagnosis and effective management of OSA, rather than no plan. (Conditional recommendation, very low certainty of evidence) Remarks: Consider ordering post-discharge testing or sleep medicine evaluation prior to discharge. Inpatient sleep testing prior to discharge and/or telehealth medicine may be an option to reduce barriers to care. Consider care coordination to ensure appropriate follow-up and post-discharge care.

Support (if any):

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0669

MRI-DERIVED PERIVASCULAR SPACE VOLUMES IN CPAP-TREATED OBSTRUCTIVE SLEEP APNEA

Justyna Swierz¹, Rishi Ananth¹, Briana Meyer¹, Bella Shafizadeh¹, Miranda Lim², Jeffrey Iliff¹, Yeilim Cho¹

¹VISN 20 Mental Illness Research, Education and Clinical Center,

²VA Portland Health Care System, Research Service

Introduction: Obstructive sleep apnea (OSA) has been associated with cognitive decline and neurodegenerative risk, potentially through impaired glymphatic clearance. MRI-visible perivascular spaces (PVS) may relate to this dysfunction, and longitudinal studies suggest CPAP adherence may stabilize PVS progression, though evidence remains limited. We examined whether OSA severity relates to PVS burden, plasma AD biomarkers, cognition, and CSF volumetrics, and whether CPAP adherence alters these measures over time. We hypothesize that severity of OSA will be associated with greater baseline PVS burden and that PVS burden will be attenuated with consistent CPAP use.

Methods: Adults with newly diagnosed OSA and controls without OSA were enrolled in a prospective longitudinal neuroimaging study. Fourteen participants have completed baseline MRI (OSA n=8; controls n=6). Eleven participants (OSA n=8; controls n=3) have completed follow-up MRI; three participants are pending follow-up scans. Among OSA participants with follow-up MRI, 5 were CPAP-adherent and 3 were non-adherent based on device-recorded usage (≥ 4 h/night on $\geq 70\%$ of nights). PVS segmentation was performed using a validated convolutional neural network-based pipeline applied to FreeSurfer-derived regions of interest including centrum semiovale, basal ganglia, and total white matter. PVS volumes were normalized to white matter volume. Paired t-tests and ANOVA were used in preliminary comparisons.

Results: Across participants with follow-up MRI, preliminary comparisons did not reveal consistent or interpretable patterns of change in normalized PVS burden within or between groups. Early numerical differences suggested that OSA participants, particularly CPAP-non-adherent individuals, may show greater increases in PVS burden than controls and CPAP-adherent individuals. However, these observations remain tentative given the small sample and incomplete dataset.

Conclusion: These early longitudinal observations do not yet clarify whether OSA severity or CPAP use influences short-term PVS burden. Preliminary patterns suggest possible differences in PVS by OSA severity and CPAP adherence, but the current dataset is still under active enrollment and not yet complete for statistical interpretation. While additional biomarkers and cognitive measures are being collected within the study, ongoing data collection and full statistical modeling of the complete cohort are required to understand the associations between OSA severity, PVS burden, and CPAP adherence.

Support (if any): American Academy of Sleep Medicine

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0670

MOVE, BREATHE, THINK: HOW ACTIVITY AND SLEEP-DISORDERED BREATHING SHAPE CAREGIVER WELL-BEING

Priscilla Amofo-Ho¹, Ashley Curtis², Jason Craggs¹, Meredith Rowe¹, Maureen Groer³, Melanie Stearns¹, Ryan Pace¹, Christina McCrae¹

¹University of South Florida, ²Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ³University of Tennessee

Introduction: Exceeding 5 sleep-disordered breathing (SDB) events/hour at night is associated with higher risks of cardiometabolic diseases, cognitive decline, and disability. SDB is also positively associated with stress, with more events triggering a stress response. Physical activity (PA) reduces the adverse effects of stress and the likelihood of cardiometabolic conditions, thereby improving sleep. Dementia caregivers (CGs) face a higher risk of poor health outcomes. CG stress, combined with limited opportunities for PA, increases CGs' vulnerability to sleep and health problems. We examined whether sedentary lifestyle is associated with aspects of health regardless of SDB events and whether association is strongest in CGs with >5 SDB events/hour.

Methods: CGs (N=52; Mage=56, F=75.8%) with insomnia in an RCT (R01AG066081, NCT04896775) reported at baseline weekly PA (Godin-Shephard Leisure-Time questionnaire) and sleep onset latency (SOL; averaged over 7 days). They completed 1-night WatchPAT One home sleep testing, daily attention task (Joggle PVT lapses; averaged over 7 days), general/physical functioning questionnaire (36-Item Short Form Health Survey, SF-36), and reported health conditions (history of heart attacks/surgeries/diseases, major/minor stroke, diabetes, high blood pressure, high cholesterol, and GI problems aggregated to create a multimodality index). Two-way MANOVA evaluated the effects of the predictors [RDI (>5 vs < 5 SDB events/hr), PA (strenuous, moderate, sedentary), RDI X PA] on the outcomes (SOL, attention, general & physical health, multimorbidity index).

Results: Predictor groups differed across the combined outcomes individually (PA, $F(12, 82)=2.564$, $p=0.006$, Wilks' $\Lambda=0.529$, partial $\eta^2=0.273$; RDI $F(4, 41)=3.965$, $p=0.003$, Wilks' $\Lambda=0.633$, partial $\eta^2=0.367$), and interactively ($F(12, 82)=2.574$, $p=0.007$, Wilks' $\Lambda=0.528$, partial $\eta^2=0.274$). Pairwise comparisons revealed CGs with < 5 RDI and sedentary PA reported poorer general health than those with moderate PA. Additionally, CGs with < 5 RDI and sedentary PA reported higher stress levels than those with strenuous PA. Lastly, CGs with >5 RDI and sedentary PA reported greater difficulties with attention compared to those engaging in moderate PA.

Conclusion: For caregivers, sedentary lifestyle is adversely associated with stress and cognition, regardless of sleep-disordered breathing presence. Research approaches targeting multiple mechanistic pathways are necessary to address the complex psychosocial factors impacting caregivers' well-being, with an emphasis on preventing health condition onset.

Support (if any):

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0671

OBSTRUCTIVE SLEEP APNEA AND HISPANIC IDENTITY AMONG IMMIGRANT COUPLES IN UTAH

Christian Escorcía¹, Ivette Lopez¹, Bobbie Bermudez Bonilla¹, Sofia Vallejo-Riveros¹, Mona Yaptangco¹, Carmela Alcantara², Wendy Troxel³, Kelly Baron¹

¹University of Utah, ²Columbia University School of Social Work, ³RAND Corporation

Introduction: Perspectives on obstructive sleep apnea (OSA) and its symptoms vary across communities, and understanding these differences can improve the cultural proficiency of research and care with Hispanic/Latine patients. In these communities, treatment seeking, adherence, and stigma are shaped by medical mistrust, cultural values, and community-level communication, yet few studies have examined how these factors shape understandings of OSA and decisions about care. This study examined Hispanic/Latine immigrant patients' experiences with OSA, focusing on cultural mechanisms that frame motivation to address sleep problems within couples.

Methods: immigrant patients with OSA and their partners (N = 18; 9 men, 9 women; 9 patients with OSA, 9 partners; Mage = 54.3 years). A guide, developed from literature and refined with a Community Advisory Board, was used by bilingual community health workers to explore couples' sleep practices, strategies for managing OSA, and barriers and facilitators to PAP use. FGDs were audio-recorded, transcribed, and analyzed in Spanish using Braun and Clarke's thematic content analysis.

Results: Participants described boca a boca (word-of-mouth) as a key cultural mechanism through which communities disseminated information and circumvented traditional, yet mistrusted medical sources. Discussions of boca a boca were frequently paired with accounts of rushed appointments, dismissed concerns, and unclear explanations from healthcare providers. In the absence of such community-level communication, many participants were unsure whether OSA symptoms signaled a serious disease or something "normal," which lowered their perceived need for evaluation and treatment. Motivation to seek diagnosis and use PAP typically arose when friends, family, or other community members shared personal experiences, highlighted risks, and framed OSA as worthy of concern. Participants described delaying or avoiding diagnosis and treatment, sometimes for more than a decade, when these messages were lacking.

Conclusion: Findings suggest that community-wide approaches to communication, alongside community health workers bridging clinical care and community networks, may prove crucial for reducing underdiagnosis of OSA in Hispanic/Latine communities. Culturally-grounded approaches to OSA screening and treatment may consider centering cultural mechanisms like boca a boca to improve engagement and advance sleep health equity.

Support (if any):

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0672

PHARMACOKINETICS, EFFICACY, AND SAFETY OF AD109 (AROXYBUTYNIN AND ATOMOXETINE) IN PARTICIPANTS WITH OBSTRUCTIVE SLEEP APNEA AND OBESITY TAKING A GLP-1

Hsuan-Ming Yao, Laura Gell, Ron Farkas, John Cronin
Apnimed, Inc.

Introduction: AD109, an investigational oral anti-apneic neuromuscular modulator, combines in one tablet the novel antimuscarinic aroxybutynin (2.5 mg) with the selective norepinephrine reuptake inhibitor atomoxetine (75 mg). In two phase 3 clinical trials for obstructive sleep apnea (OSA), AD109 significantly improved airway obstruction and oxygenation vs placebo. This study evaluated the pharmacokinetics (PK), efficacy, tolerability and safety of AD109 when co-administered with glucagon-like peptide-1 receptor agonists (GLP-1 RA) in participants with OSA and obesity.

Methods: This was an open-label, parallel-arm, 6-week phase 2 study of AD109 in participants with mild-to-severe OSA and obesity, administered either alone or while remaining on a stable maintenance dose of a GLP-1 RA (tirzepatide, semaglutide, or liraglutide). The study consisted of a screening period, 2-day single dose PK period, followed by a 6-week AD109 dosing period. Plasma PK for aroxybutynin and atomoxetine, including maximum plasma concentration (C_{max}) and exposures (AUC_{last} and AUC_{inf}), were derived by noncompartmental analysis and evaluated using a mixed-effects model.

Results: Forty participants were enrolled and received AD109 (n=22) or AD109+GLP-1 RA (n=18). Geometric mean ratios (GMR; AD109+GLP-1 RA/AD109 alone [90% CI]) of aroxybutynin for C_{max}, AUC_{last}, and AUC_{inf} were 100.6 (68.0–148.8), 142.0 (102.1–197.5), and 152.7 (111.0–210.1), respectively. GMR of atomoxetine for C_{max}, AUC_{last}, and AUC_{inf} were 67.0 (51.0–88.1), 81.9 (57.0–117.7), and 78.2 (51.3–119.1), respectively. The proportion of participants achieving ≥50% reduction in respiratory event index based on 4% hypopnea desaturation assessed with home sleep apnea test at Week 5 in the AD109 and AD109+GLP-1 RA arms were similar (33.3% vs 29.4%, respectively). Treatment-emergent adverse events (TEAEs) were reported by 85% of participants with the majority being mild-to-moderate severity. TEAEs of dry mouth, decreased appetite, nausea, and constipation were reported with higher incidence in the AD109 alone arm. No clinically meaningful trends were detected in mean changes from baseline in lab values, physical examination variables, or vital signs. No deaths or serious TEAEs occurred.

Conclusion: AD109 was generally safe and well-tolerated in both treatment arms of this phase 2 trial, without large differences in PK when co-administered with GLP-1 RA.

Support (if any): This study was supported by Apnimed, Inc.

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0673

PHARMACOLOGIC MODULATION OF OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC ANALYSIS OF ENDOTYPE DIRECTED THERAPIES

Leonardo Ruiz Medina¹, Sowmya Siddenthil¹, Siva Suddapalli¹, Paul Schalch Lepe², Thiruvoipati Nanda Kumar¹

¹Shasta Regional Medical Center, ²SoCal Breathe Free

Introduction: Obstructive sleep apnea (OSA) is driven by four primary physiological endotypes which include upper airway collapsibility, impaired pharyngeal muscle responsiveness, high loop gain, and a low arousal threshold. These traits contribute to inter individual variability in clinical presentation and treatment response. Pharmacologic therapies that target these mechanisms represent an emerging precision medicine approach. This systematic analysis evaluates how medications modify OSA endotypes and the potential therapeutic implications.

Methods: Databases searched included PubMed covering the period from 2020 to 2024. All search results were imported into Rayyan for blinded dual screening. Two independent reviewers screened 178 titles and abstracts, followed by full text review. Disagreements were resolved by consensus. 9 studies met inclusion criteria, consisting of randomized trials, and physiologic investigations examining medication effects on OSA endotypes. Data were extracted on endotypic changes, AHI reduction, physiologic responses, and safety.

Results: Low arousal threshold: Hypnotics such as zolpidem and eszopiclone increased arousal threshold without worsening airway collapsibility. Pimavanserin selectively increased respiratory arousal threshold and reduced respiratory related arousals. Impaired pharyngeal muscle responsiveness: Atomoxetine based combinations with oxybutynin, fesoterodine, or a hypnotic enhanced upper airway muscle tone and produced AHI reductions of 30 to 50 percent in patients with moderately collapsible airways. High loop gain: Acetazolamide and sulthiame consistently reduced loop gain and improved ventilatory stability. Dronabinol demonstrated variable effects with inconsistent benefit across traits. Airway sensory and chemoreceptor dysfunction: Gefapixant, a P2X3 receptor antagonist, and a TASK channel antagonist nasal spray improved OSA severity in physiologically responsive individuals by modifying sensory and chemosensory pathways. Across included studies, pharmacotherapies produced AHI reductions ranging from 15 to 60%, with the greatest improvements observed when therapy aligned with the patient's physiological endotype.

Conclusion: This systematic analysis demonstrates that endotype targeted pharmacotherapy can produce meaningful improvements in OSA severity by modulating specific physiological traits. Benefits are most pronounced when medications are selected based on endotype profile. Larger and long term studies are required to define treatment durability and to integrate pharmacologic strategies into individualized OSA management.

Support (if any):

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0674

REAL-WORLD POST-DISCHARGE OUTCOMES IN PATIENTS WITH OBESITY HYPOVENTILATION SYNDROME TREATED WITH CPAP OR BPAP

Andrew Kim¹, John Noh¹, Seungyong Han², Prasanth Manthena¹, Kenneth Wei¹, Christopher Lau³

¹Kaiser Permanente Los Angeles Medical Center, ²Kaiser Permanente Division of Research, ³University of California Los Angeles

Introduction: Patients with obesity hypoventilation syndrome (OHS) experience high healthcare utilization and are frequently discharged from the hospital on positive airway pressure (PAP)

or noninvasive ventilation (NIV). Although guidelines recommend NIV at discharge after hypercapnic respiratory failure, real-world post-hospital practices and outcomes for patients started on different PAP modalities remain poorly characterized.

Methods: We conducted a retrospective cohort study of adults (≥ 18 years) admitted to a tertiary hospital within a large integrated health system in Los Angeles from January to December 2024 who were newly discharged with PAP therapy, identified through durable medical equipment data. Patients were included as suspected OHS based on BMI criteria or serum bicarbonate > 30 mEq/L. Those discharged to hospice or who died during the index hospitalization were excluded. Demographic characteristics, comorbidities, and post-discharge outcomes were obtained from the electronic medical record.

Results: Thirty-seven patients with suspected OHS met inclusion criteria: 14 discharged with continuous positive airway pressure (CPAP) and 23 with bilevel positive airway pressure (BPAP). CPAP group ($n=14$): Mean BMI 66 kg/m², bicarbonate 31 mEq/L, age 69 years; 64% female; mean Charlson Comorbidity Index (CCI) 6.5. Thirty-day readmission occurred in 35%, and 64% completed outpatient follow-up within an average of 13 days. BPAP group ($n=23$): Mean BMI 43 kg/m², bicarbonate 33 mEq/L, age 66 years; 35% female; mean CCI 5. Thirty-day readmission occurred in 30%, and 65% completed follow-up within an average of 14 days. There was no statistically significant difference in 30-day readmission rates between CPAP and BPAP groups ($p>0.05$). Independent of modality, patients who completed outpatient follow-up within four weeks had significantly lower readmission risk.

Conclusion: In this single-center cohort, suspected OHS patients discharged on CPAP had similar early readmission and follow-up outcomes compared with those discharged on BPAP. These findings suggest CPAP may be a reasonable discharge option in selected OHS patients when timely outpatient follow-up is ensured. Ongoing work will expand the cohort and assess longer-term outcomes to inform optimal care transition strategies for this high-risk population.

Support (if any):

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0675

SLEEP DISRUPTION SECONDARY TO DISORDERED BREATHING DIRECTS THE STRENGTH BETWEEN PHYSICAL ACTIVITY AND PHYSICAL LIMITATIONS AMONG DEMENTIA CAREGIVERS

Priscilla Amofa-Ho¹, Rufei Chen¹, Ashley Curtis², Jason Craggs¹, Meredith Rowe¹, Maureen Groer³, Melanie Stearns¹, Ryan Pace¹, Britani Holland¹, Christina McCrae¹

¹University of South Florida, ²Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ³University of Tennessee

Introduction: Sleep-disordered breathing (SDB) increases the risk of cardiovascular diseases and functional limitations. Frequent oxygen disruptions secondary to SDB reduce exercise capacity and limit physical functioning due to fatigue and damage to vasculature that supports mobility. Greater physical activity (PA) is associated with higher functional status, fewer limitations, and a lower risk of SDB. Modifiable risk factors, including sedentary lifestyles and poor sleep, provide preventative opportunities to improve and sustain physical functioning, especially among

dementia caregivers (CGs) at increased risk of poor health outcomes and physical disability. We examined how the frequency of SDB influences the relationship between PA and physical limitations among CGs with insomnia. While RDI has an inverse relationship with PA and physical functioning, its influence on the association between PA and physical functioning is complex and not well understood among CGs with insomnia.

Methods: CGs ($N=69$; Mage=56, F=75.8%) with insomnia in an RCT (NIH R01AG066081, NCT04896775) reported at baseline weekly PA (Godlin-Shephard Leisure-Time questionnaire) and general/physical functioning (36-Item Short Form Health Survey, SF-36). They completed 1-night WatchPAT One home sleep testing (Manufacturer; RDI [> 5 vs < 5 SDB events/hr]). Moderation analysis with SPSS Process Macro examined the relationships between total weekly PA, general & physical functioning, and RDI group (moderator).

Results: Moderation analysis showed a trending interaction between weekly PA and RDI group ($B=-0.16$, $SE=0.08$, $t=-2.0$, $p=0.05$), with a higher RDI group showing a weaker effect of PA on physical limitations. The relationship between PA and number of SDB events was positive and significant for participants with < 5 events ($B=0.23$, $SE=0.07$, $t=3.13$, $p=0.0026$) and for those with > 5 events ($B=0.07$, $SE=0.03$, $t=2.26$, $p=0.02$). The overall model explained 18.69% of the variance in physical functional limitations ($F[3,65] = 4.98$, $p=0.0036$).

Conclusion: Among dementia caregivers with insomnia, the association between physical activity and physical functioning weakens as disordered breathing events increase. Given the physical functioning measure assessed limitations across various mobility activities, further examination of specific activities—such as vigorous exercise versus walking a block—could reveal which functions are most affected by frequent disordered breathing events. This could lead to future interventions aimed at reducing the risk of disability.

Support (if any):

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0676

THE ASSOCIATION BETWEEN TIRZEPATIDE AND SLEEP ARCHITECTURE: POST-HOC ANALYSES FROM SURMOUNT-OSA

Atul Malhotra¹, Thomas Scammell², C.P. Shyam³, Kevin Trice³, Beverly Falcon³

¹UC San Diego Health, ²Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital, Boston, MA, USA, ³Eli Lilly and Company

Introduction: In SURMOUNT-OSA, tirzepatide reduced apnea-hypopnea index (AHI), sleep apnea-specific hypoxic burden, and body weight and improved patient-reported outcomes in adults with obesity and moderate-to-severe obstructive sleep apnea (OSA). The association between tirzepatide and sleep architecture has not been investigated.

Methods: SURMOUNT-OSA included two phase 3 studies evaluating tirzepatide versus placebo for 52 weeks. Study 1 included participants not on positive airway pressure (PAP), while Study 2 participants were on PAP therapy. In these post-hoc analyses, we present changes in sleep architecture (N1, N2, N3, and REM) at week 52 with tirzepatide vs placebo in participants who received ≥ 1 dose of study drug, using on-treatment data, excluding

post-discontinuation data and data after PAP initiation for Study 1 (efficacy analysis set).

Results: At baseline, in Study 1, the duration (min) of REM sleep was 50.0 ± 29.54 , stage N1 66.7 ± 41.10 , N2 207.6 ± 60.19 , and N3 35.5 ± 37.85 . In Study 2, REM sleep duration was 45.2 ± 28.23 , N1 77.7 ± 42.07 , N2 204.2 ± 58.18 , and N3 24.7 ± 29.42 . Baseline stage durations were similar across treatment arms. At week 52, the amount of REM sleep (min) increased 14.3 ± 2.93 with tirzepatide and 5.0 ± 3.16 with placebo ($p=0.032$) in study 1, and 20.0 ± 2.65 with tirzepatide and 1.4 ± 2.98 with placebo ($p < 0.001$) in study 2. The change in N1 (min) was -12.2 ± 3.08 with tirzepatide and 0.4 ± 3.32 with placebo ($p=0.006$) in study 1, and -21.1 ± 3.24 with tirzepatide and -0.4 ± 3.62 with placebo ($p < 0.001$) in study 2. The change in N2 (min) was 0.4 ± 5.05 with tirzepatide and 5.3 ± 5.47 with placebo ($p=0.512$) in study 1, and 6.2 ± 5.12 with tirzepatide and 9.9 ± 5.73 with placebo ($p=0.634$) in study 2. The change in N3 (min) was -6.1 ± 2.27 with tirzepatide and -12.0 ± 2.43 with placebo ($p=0.076$) in study 1, and -1.7 ± 2.27 with tirzepatide and -7.1 ± 2.54 with placebo ($p=0.114$) in study 2.

Conclusion: While there were small increases in N2 and decreases in N3 sleep duration, these changes were less pronounced with tirzepatide than with placebo. Overall, these studies indicate that treatment with tirzepatide was associated with an increased amount of REM sleep and a reduction in light N1 sleep.

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0677

THE EFFECT OF ENHANCED INDOOR OXYGEN LEVEL ON BLOOD OXYGEN SATURATION IN INDIVIDUAL WITH OBSTRUCTIVE SLEEP APNEA

Kwang Ik Yang¹, Wahyu Chandra Pradana², Jiwon Lim¹, Seongha Jo², Birhan Legese Gurm², Sungroul Kim²

¹Soonchunhyang University Cheonan Hospital, ²Soonchunhyang University

Introduction: While the physiological aspects of obstructive sleep apnea (OSA) have been extensively studied, less attention has been given to the role of environmental factors, particularly indoor air quality, in individuals with potential OSA. This study investigates the efficacy of non-invasive environmental strategy—elevating indoor oxygen(O₂) levels—as a complementary approach for individuals at potential risk of OSA.

Methods: We conducted a crossover trial with 20 participants, each undergoing two overnight polysomnography (PSG) tests: a sham control and an intervention night. During the intervention, a point-source oxygen diffusion system (80% purity, 8 L/min) increased indoor O₂ concentration. We simultaneously monitored indoor air quality (IAQ) parameters, including O₂ and carbon dioxide (CO₂), alongside standard PSG and blood oxygen saturation (SpO₂) data.

Results: The intervention significantly increased indoor O₂ by a median of 1.4% ($p < 0.001$). This change demonstrated a strong positive correlation ($r=0.76$, $p < 0.01$) with SpO₂. Multivariate regression analysis further confirmed that a 1% increase in indoor O₂ predicted a 0.5% increase in nocturnal SpO₂ after controlling for age, sex, BMI, and baseline OSA severity.

Conclusion: This study demonstrates that a moderate increase in environmental oxygen can significantly improve nocturnal blood

oxygen saturation among individuals with OSA. Our pioneering findings suggest that environmental indoor oxygen enrichment could serve as a simple, non-invasive, and complementary strategy to support sleep health, particularly for those with mild to moderate OSA.

Support (if any):

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0678

A RARE CASE OF SODIUM OXYBATES-ASSOCIATED CENTRAL SLEEP APNEA: FIRST KNOWN USE OF ADAPTIVE SERVO VENTILATION FOR SUCCESSFUL THERAPY

Christopher Williams, Adel Zurob, Ali Zaied, Hussam Al-Sharif, Mamta Chhabria, Aryan Shiari
Mayo Clinic Health System

Introduction: Central sleep apnea (CSA) may occur as an adverse effect of sodium oxybates, a medication commonly used to treat narcolepsy with cataplexy. Management is challenging, as sodium oxybates remain essential for symptom control in many patients, yet untreated CSA poses substantial respiratory risk. We present a rare case of sodium-oxybate-associated CSA successfully treated with adaptive servo ventilation (ASV), representing, to our knowledge, the first documented use of ASV for this indication.

Methods: A 49-year-old woman with longstanding narcolepsy with cataplexy presented with worsening daytime sleepiness despite stable use of sodium oxybate. She had been receiving a very high dose prescribed by an outside provider (6.75 g twice nightly), exceeding the recommended maximum of 4.5 g twice nightly, and her dose was subsequently adjusted to 4.5 g twice nightly. An in-lab polysomnogram revealed moderate central sleep apnea (AHI 21; RDI 23) with predominantly central events. Because the patient did not wish to wean or discontinue sodium oxybate—reporting that it remained the only therapy that consistently improved her sleep and cataplexy—adaptive servo ventilation (ASV) titration was pursued as the next step in management. She had previously failed multiple stimulants, wake-promoting agents, and SSRIs due to either limited efficacy or intolerable side effects. Her BMI was 18 kg/m², she was not taking any CNS depressant medications, and her echocardiogram demonstrated a normal ejection fraction.

Results: The patient tolerated ASV well. Final settings included an EPAP of 5 cm H₂O with a pressure support range of 3–15 cm H₂O and minimal leak. Her adherence was excellent, with more than 93% of nights exceeding four hours of use. Residual AHI improved to 4.6 events per hour, accompanied by noticeable improvement in daytime alertness. She continued sodium oxybate without any respiratory complications.

Conclusion: ASV may be an effective and well-tolerated therapy for sodium-oxybate-induced CSA in patients who must continue the medication. Sodium oxybate can induce CSA by acting on GABA-B receptors in the Kölliker-Fuse and pre-Bötzinger complex, suppressing respiratory drive and depressing hypoglossal motor output. This case highlights the successful use of ASV in treating CSA secondary to oxybates when the medication cannot be weaned or discontinued.

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0679

AROXYBUTYNIN AND ATOMOXETINE (AD109) AND PATIENT-REPORTED OUTCOMES: A POOLED ANALYSIS OF THE SYNAIRGY AND LUNAIRO TRIALS IN OBSTRUCTIVE SLEEP APNEA

Patrick Strollo¹, Douglas Kirsch², Kathleen Sarmiento³, Laura Gell⁴, Huy Pho⁴, Ron Farkas⁴, Luigi Taranto-Montemurro⁴, John Cronin⁴, Sanjay Patel⁵

¹Veteran Affairs Pittsburgh Healthcare System, ²Atrium Health,

³Department of Medicine, Pulmonary, Critical Care, Allergy, and Sleep Medicine, University of California San Francisco,

⁴Apnimed, Inc., ⁵Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: Symptom burden in obstructive sleep apnea (OSA) varies widely among patients. AD109 is an investigational oral anti-apneic neuromuscular modulator that combines in one tablet the novel antimuscarinic, aroxybutynin (2.5 mg), with the selective norepinephrine reuptake inhibitor, atomoxetine (75 mg). AD109 significantly improved objective measures of airway obstruction and oxygenation vs placebo (PBO) in two phase 3 clinical trials in OSA. This analysis focuses on change in patient-reported symptoms—including fatigue, sleep impairment, and daytime sleepiness—observed across both trials.

Methods: SynAIRgy (NCT05813275; N=646) and LunAIRo (NCT05811247; N=660) were randomized, double-blind, PBO-controlled, parallel-arm phase 3 trials of AD109 vs PBO in adults with mild-to-severe OSA (AHI >5) intolerant to or refusing positive airway pressure therapy. Patient reported outcomes (PROs) at Week 26 included the Patient Reported Outcome Measurement Information System (PROMIS)-Fatigue (F) T-score, PROMIS-Sleep Impairment (SI) T-score, and Epworth Sleepiness Scale (ESS). Pooled analyses were performed comparing change from baseline according to the on-treatment estimand, including all randomized participants who received ≥1 dose of study medication and had ≥1 post-baseline on-treatment polysomnogram. The integrated PRO analysis was also performed in participants with baseline excessive daytime sleepiness (ESS≥10).

Results: In the pooled analysis of PROs utilizing the on-treatment estimand (AD109: n=500; PBO: n=589), results (LS mean difference [SE]) numerically favored AD109 over PBO in PROMIS-F T-score (−0.48 [0.43]; P=0.27), PROMIS-SI T-score (−0.54 [0.48]; P=0.26) and ESS (= −0.18 [0.21]; P=0.4) at Week 26. A higher proportion of participants receiving AD109 achieved ≥3 point improvement in ESS at Week 26 relative to PBO (48.2% vs 41.6%; P=0.018). In participants with baseline excessive daytime sleepiness (AD109: n=280; PBO: n=294), AD109 significantly improved PROMIS-F and PROMIS-SI T-scores (LS mean±SE) at Week 26 by −8.8±0.4 and −9.9±0.5 points, respectively (vs −7.2±0.4 and −8.2±0.5 with PBO; P=0.007 and P=0.01). Similarly, AD109 significantly improved ESS (LS mean ± SE) at Week 26 by −4.5±0.2 points in participants having baseline excessive daytime sleepiness (vs −3.9±0.2 with PBO; P=0.04).

Conclusion: AD109 significantly improved patient-reported fatigue and sleepiness in participants with OSA, particularly those with defined sleepiness.

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0680

EVALUATING ALTERNATIVES: INSIGHTS FROM DRUG-INDUCED SLEEP ENDOSCOPY IN WOMEN WITH REM-PREDOMINANT OBSTRUCTIVE SLEEP APNEA

Candace Miyaki¹, Ashwini Bandi², Pranav Mehta², Uriet Dewan³, Alexandria Fornerette-Harris¹, LeQuan Dang¹, Antara Mallampalli¹, Supriya Singh¹

¹Baylor College of Medicine, ²University of Texas - Houston,

³University of St. George's University

Introduction: Moderate to severe rapid eye movement (REM)-related Obstructive Sleep Apnea (OSA) presents unique treatment challenges, particularly for patients unresponsive to standard therapies. This case series describes 20 women with REM predominant OSA who underwent Drug-Induced Sleep Endoscopy (DISE) to assess suitable alternatives to positive airway pressure (PAP) therapy.

Methods: We identified a cohort of 20 women aged 36 to 73 years with a BMI ranging 25 to 35 kg/m² who underwent DISE and had predominantly mild to moderate OSA by total AHI but moderate to severe REM OSA (total AHI range 5.6-44.7/hr vs REM AHI range 19-93/hr on baseline study).

Results: Of the 20 patients, 18 showed significant anterior-posterior (AP) collapse of the velum and base of the tongue during DISE while 2 patients exhibited complete circumferential collapse of the velum. Out of the 18 patients, 16 had complete AP collapse at both sites and 5 had partial (< 50%) lateral wall collapse of the hypopharynx. Among this cohort, 13 patients proceeded with hypoglossal nerve stimulator (HGNS) implantation; one required additional intervention which included nasal septoplasty along with hyoid suspension due to persistent lateral wall collapse of the hypopharynx. Of the remaining seven patients, one received a mandibular advancement device, three underwent turbinate reduction and septoplasty, one had uvulopalatopharyngoplasty (UPPP), and two continued with PAP therapy. Significant improvements were observed in both total and REM AHI on repeat polysomnogram (PSG) after HGNS treatment. Monotherapy with UPPP, turbinate reduction, or septoplasty did not yield significant improvements in AHI; however, when utilized as part of a multimodal approach, a marked reduction in AHI was noted. Those patients who chose to continue PAP therapy displayed continued poor adherence, resulting in ongoing untreated OSA.

Conclusion: DISE provides crucial insights into specific patterns of airway collapsibility in women with moderate to severe REM OSA. The results demonstrate that personalized treatment strategies, particularly HGNS and targeted surgical interventions, can lead to significant improvements in outcomes of PAP-intolerant patients. Our findings highlight the need for further research to refine and optimize treatment approaches to ensure that treatment for women should be tailored not only to total AHI but also REM AHI.

Support (if any):

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0681

IMPACT OF SINONASAL OPTIMIZATION AND STRUCTURED COACHING ON 90-DAY CPAP ADHERENCE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Dominic Munafo¹, Bretton Lane¹, Doug Liepert², Taimi Liepert², William Hevener¹, Ethan Handler², Christopher Navarro¹, Kim D'ambra¹, Madan Kandula²

¹BetterNight, LLC, ²Advent, LLC

Introduction: CPAP therapy remains the gold standard for treating OSA. Unfortunately, many patients struggle with CPAP adherence. Frequently, patients have only 90 days to meet criteria for adherence to assure coverage. This study evaluated the effectiveness of a comprehensive nasal airway evaluation and appropriate minimally invasive sinonasal surgery coupled with comprehensive CPAP coaching on Medicare CPAP adherence.

Methods: This was a retrospective study of 2700 patients diagnosed with OSA (AHI ≥ 5) who underwent sinonasal evaluation and CPAP treatment between April 2023 and August 2025 from a multi-state ENT practice. Physicians performed thorough sleep and sinonasal evaluation consisting of an in-depth history, physical examination, sinonasal imaging, and endoscopy. When clinically appropriate, patients were offered minimally invasive procedures—including balloon sinuplasty and extensive turbinate and swell body reduction—to improve nasal and sinus patency prior to CPAP initiation. All patients began therapy with an APAP machine and were enrolled in a proprietary exception management coaching program, Clarity™. Non-adherent patients were contacted via email and/or text on days 3, 10, 20, 45, 60 and 80 to troubleshoot and resolve patient difficulties. Coaching calls were performed by respiratory therapists or registered polysomnographic technicians. The primary endpoint was Medicare adherence at 90 days.

Results: Medicare CPAP adherence was 84.4% at 90 days. Patients were 77% male, age 52.0 ± 12.4 , BMI 35.4 ± 7.0 , AHI 42.8 ± 24.9 (mean $\pm$ SD). OSA severity based on Chicago criteria was 11% mild, 23% moderate, and 66% severe. Adherence by severity was 81%, 83%, and 85% respectively. Mask choice was 57% nasal pillows, 31% nasal mask and 11% full face mask. Adherence by mask type was 84%, 86%, and 84% respectively. Adherence by sex was male 84% and female 85%.

Conclusion: CPAP adherence in this cohort was excellent and much better than historically published data. The data suggest that assessing and optimizing nasal anatomy coupled with a comprehensive coaching program can drive improved CPAP adherence. Further research is needed to determine the specific impact of the various minimally invasive surgical procedures.

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0682

MASK EXPERIENCE AMONG POSITIVE AIRWAY PRESSURE THERAPY-TREATED PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

R. Dexter¹, Caleb Woodford², Naomi Alpert¹, Will McConnell², Kimberly Sterling²

¹Resmed, ²Resmed Science Center

Introduction: Positive airway pressure (PAP) therapy is highly efficacious for treating obstructive sleep apnea (OSA). However,

patients may struggle to become adherent to therapy without appropriate support. This analysis examined survey responses from a patient engagement tool to characterize early PAP experiences and identify common patient-reported concerns.

Methods: Check-ins accessed through the myAir (Resmed) app platform are designed to improve adherence to PAP therapy by providing educational content based on answers to periodic questions. Surveys administered in the app starting in April 2024 on Day 7 (n=905,450) and Day 28 (n=695,033) of therapy were examined. At each time point, patients were asked how their therapy was going, and to identify the primary challenge if they were struggling. Results were summarized overall, and by mask type (full face, nasal, and nasal pillow, regardless of brand) and gender.

Results: At Day 7, 30%, 47%, and 22% reported that therapy was going 'great', 'ok', and 'challenging', respectively. Of those who reported 'ok' or 'challenging', the most common concern was with their mask. Of mask issues, general discomfort (ie: 'getting used to the mask'; 38%), air leaks (22%), and fit (19%) were the most prevalent. Among those reporting mask concerns, air leaks were more common among those with full-face masks (29%) compared to those with nasal (17%) or nasal pillow (13%) masks, while general discomfort was less common (full-face: 35% vs. nasal: 41% and nasal pillow: 39%). Females were more likely to report any issue in general, and a mask issue specifically, although the types of mask concerns were similar across gender. Similar trends emerged among patients who responded at Day 28, although fewer patients reported issues both overall and about masks at that time.

Conclusion: In the first month of therapy, patients struggling to adjust to PAP identified mask-related issues as a primary concern. These results suggest that mask fit and comfort substantially shape patient experience. Greater emphasis on mask trial and individualized fit at therapy initiation may help address common barriers to treatment acceptance and support more patients in establishing stable, compliant therapy earlier.

Support (if any): Resmed

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0683

RESOLUTION OF CENTRAL SLEEP APNEA WITH MULTIMODALITY THERAPY - CPAP PLUS OXYGEN OR ACETAZOLAMIDE

Stuti Shankar¹, Ali Mustapha¹, Mohamed Nasry¹, Maria Fatima¹, Moustafa Habra², Maanas Sharma¹, Summer Habra¹, Nishtha Pandya¹, Susmita Chowdhuri¹, Anan Salloum¹, Salam Zeineddine¹, Samiran Ghosh³, Jennifer Martin⁴, Abdulghani Sankari¹, M. Safwan Badr¹

¹Wayne State University, ²Detroit John D. Dingell VA Medical Center, ³University of Texas, Houston, ⁴UCLA

Introduction: CPAP therapy -first-line therapy for central sleep apnea (CSA)- rarely eliminates CSA. Other options include acetazolamide and low-flow oxygen (O2). The purpose of this investigation was to determine the efficacy of adding acetazolamide, low-flow O2, or both to CPAP therapy for central sleep apnea treatment.

Methods: A randomized, double-blinded, crossover study evaluated the efficacy of acetazolamide, O2, and their combination in improving CSA compared with PAP therapy. Participants completed full polysomnography at 1) baseline, 2) PAP therapy, and

under three experimental conditions for 4 weeks: 3) Acetazolamide (250 mg qhs), 4) O₂ (2-4 L/min), and 5) Acetazolamide plus O₂. Conditions (3) and (4) were administered in random order. Participants received PAP therapy throughout the study. 24 participants completed an overnight apneic threshold study under conditions 1-3. Outcomes include the Central Apnea-Hypopnea Index (CAHI), Central Apnea Index (CAI), Total Apnea-Hypopnea Index (AHI), CO₂ Reserve, Plant Gain, Controller Gain, and Controller Gain (Nadir). An analysis of variance (ANOVA) model compared intervention effects across groups with reference categories.

Results: 35 male participants with CSA (AHI $\geq$ 10/hour and a CAHI $\geq$ 5/hour) were randomized (Age = 65 ± 12.5 years, BMI = 32.2 ± 5.3 kg/m²). At baseline, Epworth Sleepiness Scale (ESS) was 7.5 ± 4.7 , and the Insomnia Severity Index (ISI) score was 7.1 ± 5.8 . There was a statistically significant decrease in CAHI from baseline (30.9 ± 4.2) to PAP baseline (18.2 ± 2.9) and further decrease under acetazolamide (4.9 ± 1.6), O₂ (4.1 ± 1.6), and both ($4.8 \pm .9$). 24 participants completed the physiologic studies. There was no difference in the CO₂ reserve under acetazolamide (-3.2 ± 0.16 mmHg), O₂ (-3.2 ± 0.2) and both (-3.5 ± 0.2). Controller and plant gains were also not different across the experimental conditions.

Conclusion: 1) Nasal CPAP therapy ameliorated but did not resolve CSA. 2) Adding acetazolamide, low-flow O₂, or both resulted in the resolution of CSA. 3) There is no difference between Acetazolamide and O₂ for apneic threshold variables. 4) These findings support combined therapy with PAP plus a pharmacologic intervention.

Support (if any):

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0684

TREATMENT OF CENTRAL SLEEP APNEA IN ADULTS: AN AMERICAN ACADEMY OF SLEEP MEDICINE CLINICAL PRACTICE GUIDELINE

M. Safwan Badr¹, Rami Khayat², J. Shirine Allam³, Suzanne Hyer⁴, Reem Mustafa⁵, Matthew Naughton⁶, Susheel Patil⁷, Grace Pien⁸, Winfried Randerath⁹, Christine Won¹⁰

¹Wayne State University, ²Penn State University, ³Emory University, ⁴American Academy of Sleep Medicine, ⁵University of Kansas Medical Center, ⁶Alfred Hospital, ⁷University Hospitals of Cleveland, ⁸University of Pennsylvania, ⁹Krankenhaus Bethanien, ¹⁰Yale University

Introduction: This guideline establishes clinical practice recommendations for treatment of central sleep apnea (CSA) syndromes in adults.

Methods: The American Academy of Sleep Medicine (AASM) commissioned a task force of experts in sleep medicine to develop recommendations and assign strengths based on a systematic review of the literature and an assessment of the evidence using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. The task force provided a summary of the relevant literature and the certainty of evidence, the balance of benefits and harms, patient values and preferences, and resource use considerations that support the recommendations. The AASM Board of Directors approved the final recommendations.

Results: Good Practice Statement: The following good practice statement is based on expert consensus, and its implementation is necessary for the appropriate and effective management of patients with CSA. The optimal approach to CSA treatment should incorporate clinical features, co-morbid conditions, and polysomnographic findings in an individualized manner. Specifically, clinicians must prioritize optimizing therapy for the conditions contributing to central apneas and improving patient-reported outcomes rather than solely focusing on eliminating disordered breathing events. Once therapy for CSA has been initiated, persistence of central respiratory events should prompt re-evaluation of the underlying risk factors and consideration of alternative treatment options. The following recommendations are intended as a guide for clinicians in choosing a specific treatment for adults with CSA. Each recommendation statement is assigned a strength ("Strong" or "Conditional"). A "Strong" recommendation (i.e., "We recommend...") is one that clinicians should follow under most circumstances. A "Conditional" recommendation (i.e., "We suggest...") is one that clinicians should offer to most patients if clinically appropriate. Some recommendations include remarks that provide additional context to guide clinicians with the implementation of this recommendation.

Conclusion: 1. The AASM suggests using continuous positive airway pressure (CPAP) over no CPAP in adults with CSA due to the following etiologies: primary CSA, CSA due to heart failure, CSA due to medication or substance use, treatment-emergent CSA, and CSA due to a medical condition or disorder. (Conditional recommendation, low certainty of evidence) 2. The AASM suggests using bilevel positive airway pressure (BPAP) with a backup rate over no BPAP with a backup rate in adults with CSA due to the following etiologies: primary CSA, CSA due to medication or substance use, treatment-emergent CSA, and CSA due to a medical condition or disorder. (Conditional recommendation, very low certainty of evidence) 3. The AASM suggests against the use of BPAP without a backup rate in adults with CSA due to the following etiologies: primary CSA, CSA due to heart failure, CSA due to medication or substance use, treatment-emergent CSA, and CSA due to a medical condition or disorder. (Conditional recommendation, very low certainty of evidence) 4. The AASM suggests using adaptive servo ventilation (ASV) over no ASV in adults with CSA due to the following etiologies: primary CSA, CSA due to heart failure, CSA due to medication or substance use, treatment-emergent CSA, and CSA due to a medical condition or disorder. (Conditional recommendation, low certainty of evidence) Remarks: Prior to initiation of ASV, patient-provider shared decision-making is recommended, and treatment decisions should be based on expectations of symptomatic or quality-of-life improvement. Treatment with ASV in patients with heart failure with reduced ejection fraction (HFrEF) should be limited to centers with experience, along with close monitoring and follow-up. 5. The AASM suggests using low-flow oxygen over no low-flow oxygen in adults with CSA due to heart failure. (Conditional recommendation, low certainty of evidence) 6. The AASM suggests using low-flow oxygen over no low-flow oxygen in adults with CSA due to high altitude. (Conditional recommendation, very low certainty of evidence) Remarks: Patients with transient and mild CSA symptoms at high altitude may reasonably decline treatment with low-flow oxygen. 7. The AASM suggests using oral acetazolamide over no acetazolamide in adults with CSA due to

the following etiologies: primary CSA, CSA due to heart failure, CSA due to medication or substance use, treatment-emergent CSA, and CSA due to a medical condition or disorder. (Conditional recommendation, low certainty of evidence) 8. The AASM suggests using oral acetazolamide over no acetazolamide in adults with CSA due to high altitude. (Conditional recommendation, very low certainty of evidence) 9. The AASM suggests using transvenous phrenic nerve stimulation (TPNS) over no TPNS in adults with CSA due to the following etiologies: primary CSA and CSA due to heart failure. (Conditional recommendation, very low certainty of evidence) Remark: Given that TPNS requires an invasive procedure, is not universally accessible, and is associated with high costs, it may be more appropriate to consider other treatments first.

Support (if any):

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0685

A MOTIVATIONAL ENHANCEMENT INTERVENTION IMPROVES CPAP USE IN OLDER ADULTS WITH MILD COGNITIVE IMPAIRMENT: A ONE-YEAR TRAJECTORY

Kathy Richards¹, Jieun Lim², Wenyan Ji³, Alicia Lozano³, Hanlon Alexandra³, Vani Vallabhaneni⁴, Luqi Chi⁵, Eric Davis⁶, Cynthia Cheng⁷, Stephen Moelter⁸, David Wolk⁹, Nalaka Gooneratne⁹

¹University of Texas at Austin, ²University of Pennsylvania School of Nursing, ³Virginia Tech, ⁴Sleep 360, ⁵Washington University, ⁶University of Virginia, ⁷Thomas Jefferson University, ⁸Saint Joseph's University, ⁹University of Pennsylvania

Introduction: Approximately one-third of adults with obstructive sleep apnea (OSA) exhibit comorbid cognitive impairment. Although continuous positive airway pressure (CPAP) therapy has the potential to slow cognitive deterioration, suboptimal adherence may diminish therapeutic dose and limit clinical benefit.

The aim of this analysis was to describe the effects of a tailored motivational enhancement intervention on the 1-year trajectory of CPAP adherence in older adults with mild cognitive impairment (MCI), and to identify predictors of CPAP adherence in this population.

Methods: Data were drawn from Memories 2, a multisite trial evaluating whether treatment of moderate to severe OSA slows cognitive decline in adults aged 65-85 years with MCI. Participants received a tailored telehealth CPAP adherence intervention comprising: 1) OSA education, treatment expectations, and strategies to reduce barriers; 2) motivational enhancement to align CPAP use with participants' health goals, strengthen self-efficacy, and address common CPAP challenges; and 3) social support by a study partner. Unadjusted and adjusted linear and logistic models examined predictors of 1-year CPAP use. Predictors included age, sex, race, ethnicity, education, apnea-hypopnea index (AHI), body mass index, daytime sleepiness, CPAP adherence intervention participation, and cognitive status.

Results: Among 172 participants with 1-year adherence data, 56% were male and 71% were White; mean age was 67.2 years, and mean AHI was 34.4 (SD 20.9). The proportion adherent (defined as mean nightly use of ≥ 4 hours) was 74% at 3 months, 72% at 6 months, 68% at 9 months, and 65% at 12 months. In adjusted models, White race ($\beta = 2.12$, SE = 0.54, $p < 0.001$), severe OSA ($\beta = -0.77$, SE = 0.39, $p = 0.047$) and intervention participation ($\beta = 0.49$, SE = 0.10, $p < 0.001$) were significantly associated with 1-year CPAP use.

Conclusion: A tailored telehealth motivational enhancement intervention produced high CPAP adherence across 12 months in older adults with MCI and moderate-severe OSA, outperforming adherence levels typically reported in general older adult populations. Additional strategies are needed to improve adherence in Black persons, who demonstrated lower use despite intervention exposure.

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0686

FURTHER DEVELOPMENT OF PHOTOPLETHYSMOGRAPHY (PPG) BASED NARCOLEPSY TYPE-1 DETECTION FOR HSATSChris Fernandez¹, Tom Vanasse¹, Yoav Nygate¹, Sam Rusk¹, Matt Sprague¹, Jan Wodnicki¹, Fred Turkington¹, Nick Glattard¹, Nathaniel Watson²¹EnsoData Research, EnsoData, ²University of Washington School of Medicine, Department of Neurology

Introduction: Narcolepsy Type-1 (NT1) is a chronic, rare, debilitating neurological disorder characterized by sleepiness, cataplexy, sleep disturbance, and other symptoms. Previous studies demonstrated sleep staging and sleep architectural parameters from home sleep apnea test (HSAT) photoplethysmography (PPG) could identify NT1 with reasonable ROC-AUC. We seek to build on prior work using recent developments in deep learning architectures and training methods to improve the performance and generalizability for identifying NT1 patients with PPG in routine HSATs.

Methods: We applied deep learning (DL) models to the Mignot Nature Communications (MNC) dataset available through NSRR. This dataset utilized cerebrospinal fluid (CSF) orexin deficiency as the gold-standard for NT1 diagnosis. Two AI models were applied: one using multi-channel EEG inputs and another using only PPG input. 2-Fold cross-validation was applied. First, we tested models on the MNC studies where PPG was available, which included N=37 NT1 patients, N=14 healthy controls, and N=38 non-narcoleptic hypersomnia controls. Second, we tested models on an out-of-distribution sample of multi-night PPG-based HSATs, which included N=19,074 patients with age (mean: 49.3-years, SD=13.6), BMI (mean: 31.3, SD=6.6), and gender (35% female, 65% male). N=105 patients had ≥ 2 SOREMPs and a Mean Sleep Latency < 8 minutes, which were used to establish the NT1-positive labels based on the standard criteria in multiple sleep latency tests (MSLTs).

Results: The EEG model had a receiver-operating-characteristic (ROC) area-under-the-curve (AUC) of 0.841 in MNC. The PPG model had a ROC-AUC of 0.717 in the same MNC data. Performance of the PPG-only DL model in MNC was further characterized with a 54.5% Sensitivity at the 75% Specificity threshold, 48.6% Sensitivity at the 85% Specificity threshold, and 21.6% Sensitivity at 95% Specificity threshold. In the out-of-sample analysis of N=19,074 multi-night HSATs, an ROC-AUC of 0.629 was observed, corresponding to 46% Sensitivity at the 75% Specificity threshold, and 32.2% Sensitivity at 85% Specificity threshold. While the EEG model achieved the greatest overall performance, PPG-DL appeared to generalize preferably to simpler ML approaches (e.g. Random Forest) in the large-scale retrospective home sleep testing dataset.

Conclusion: The PPG-based deep learning model showed moderate overall performance for NT1 detection in gold-standard PSG and large-scale HSAT datasets.

Support (if any):

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0687

VALIDATION OF WAVEBAND FOR CAPTURING SLEEP IN HYPERSOMNIA DISORDERSDennis Hwang¹, Rebecca Reh², Marta Karas³, Alexander Chan², Jay Pathmanathan², Jayne Nerrie², Antoine Guillot², Jason Manley², Katerina Placek³, Brian Tracey³, Patrick Tierney³, Tarik Yardibi³, Emmanuel Mignot⁴, Jacob Donoghue², Dmitri Volfson⁵¹Kaiser Permanente, Southern California, ²Beacon Biosignals, Inc., ³Takeda Development Center Americas, Inc., ⁴Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁵Takeda Development Center Americas, Inc.

Introduction: Narcolepsy type 1 (NT1) is a rare neurological disorder linked to orexin deficiency. It is characterized by excessive daytime sleepiness, cataplexy, hallucinations, sleep paralysis, disrupted nighttime sleep, and cognitive symptoms. Diagnosis and therapeutic evaluation rely on in-clinic polysomnography (PSG) and multiple sleep latency testing (MSLT), which can be resource-intensive, burdensome, and inconsistent. NCT06531876 evaluated Waveband, an FDA-cleared at-home dry-electrode electroencephalogram (EEG), in individuals with NT1 and suspected central disorders of hypersomnolence (CDH). Following data collection, a new Waveband sleep-staging algorithm (WSSA) was implemented under an FDA-authorized Predetermined Change Control Plan.

Methods: Seventy-five participants (50 NT1; 25 suspected CDH) undertook six nights of at-home Waveband sleep recording and one 24-hour recording, followed by one or two nights of in-clinic PSG and a single MSLT, each with concurrent Waveband recording. Wear-time compliance and data quality were assessed via existing algorithms. PSG/MSLT data were scored by three registered PSG technologists, and Waveband data were scored using the WSSA.

Results: All participants completed ≥ 4 overnight recordings with ≥ 4 hours of wear time (mean [SD]: 7.9 [1.8] hours/night, 98% [5%] of data deemed scorable). For the 24-hour period, 93% of participants had ≥ 17 hours of wear time (mean [SD]: 22.2 [2.7] hours, 99% [1%] of data deemed scorable). The updated WSSA demonstrated high agreement with PSG in NT1 participants (mean Cohen's Kappa: 0.81) and positive agreement across sleep stages: wake (87%), NREM1 (59%), NREM2 (87%), NREM3 (82%), and REM (90%) sleep. It accurately identified sleep-onset REM periods during PSG/MSLT with 74/76% sensitivity and 100/97% specificity. Concordance (ICC) between Waveband and PSG macrofeatures was strong, including sleep efficiency (0.94), wake after sleep onset (0.95), sleep onset latency (0.89 [PSG], 0.90 [MSLT]), and REM within 120 minutes of sleep onset (0.87). Comparable performance was seen in participants with suspected CDH.

Conclusion: Waveband enables accurate, scalable at-home sleep evaluation in hypersomnia with high compliance and data quality. The updated WSSA outperforms the prior algorithm and reliably detects EEG features of narcolepsy. These results support the use of Waveband in NT1 clinical trials and for real-world clinical evaluations of cases with suspected hypersomnolence disorders.

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0688

VALIDATION OF A PEDIATRIC CATAPLEXY SURVEY FOR CHILDREN AND ADOLESCENTS WITH NARCOLEPSY TYPE 1Grace Wang¹, Lisa Meltzer², Emmanuel Mignot³, Indra Narang⁴, Jennifer Worhach¹, Michael Strunc⁵, Anne Morse⁶, Julie Flygare⁷, Georgios Sideridis⁴, Kiran Maski⁸¹Boston Children's Hospital, ²National Jewish Health, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁴The Hospital for Sick Children, ⁵Children's Hospital of The King's Daughter, ⁶Geisinger Medical Center, Janet Weis Children's Hospital, ⁷Project Sleep, ⁸Department of Neurology, Boston Children's Hospital

Introduction: Cataplexy is core symptom of pediatric narcolepsy type 1 (NT1) but there is currently no validated cataplexy scale that captures the frequency, severity, and impact of cataplexy for children and adolescents. In this multi-center study, we developed and validated a 7-item Pediatric Cataplexy Scale (PCS) to further pediatric NT1 clinical care and research.

Methods: We performed psychometric evaluation of the PCS using item response theory, specifically a graded response model (GRM). Sixty-nine children and adolescents with NT1 (age 9-21) from six North American sites completed the study. We examined the 7-item scale for internal consistency reliability (α , ω , marginal reliability), global and local model fit within the GRM framework, item discrimination and threshold ordering, convergent and divergent validity, and measurement invariance across sex.

Results: Internal consistency was strong using all three indicators. The freely estimated GRM provided superior fit over a Rasch-constrained model ($p=0.032$) and excellent global fit indices (CFI=0.996; TLI=0.995; RMSEA=0.041; SRMR=0.041). Convergent validity was supported by significant correlations with the Narcolepsy Severity Scale ($r=0.459$, $p<0.001$) and the PedsQL Psychosocial Health Summary Score ($r=-0.295$, $p=0.014$). Divergent validity was demonstrated through nonsignificant associations with the respiratory disturbance index and body mass index. Measurement invariance testing showed minimal non-invariance across sex, with no significant differences in latent means.

Conclusion: The PCS shows desirable psychometric properties and can be used in clinical and research settings to assess cataplexy symptoms in NT1 youth.

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0689

A CONCEPTUAL DISEASE MODEL OF THE SYMPTOMS AND IMPACTS OF NARCOLEPSY TYPE 1 FROM THE PATIENT PERSPECTIVECristina Casstevens¹, Nancy Foldvary-Schaefer², Kiran Maski³, David Plante⁴, Meagan Farrell⁵, Christina Graham⁵, Claire Mobley⁵, Emily Kim⁵, Mia Wraight¹, Jed Black⁶, Joshua Steiner¹, Luis Ortiz⁷¹Jazz Pharmaceuticals, ²Sleep Disorders Center, Neurological Institute, Cleveland Clinic, ³Department of Neurology, Boston Children's Hospital, ⁴Department of Psychiatry, University of Wisconsin-Madison, ⁵IQVIA, ⁶Stanford University Center for Sleep Sciences and Medicine, ⁷Johns Hopkins All Children's Hospital

Introduction: The diagnostic pentad for narcolepsy type 1 (NT1) includes cataplexy, excessive daytime sleepiness, disrupted nighttime sleep, hypnagogic/hypnopompic hallucinations, and sleep paralysis. Beyond this pentad, a broader spectrum of symptoms may impact daily functioning and quality of life. This qualitative study amplifies patient voices to identify the most bothersome and meaningful symptoms and impacts of NT1.

Methods: Participants were recruited through a third-party recruitment vendor, patient advocacy groups, and a patient conference. Twenty adults diagnosed with NT1 completed concept elicitation interviews discussing their experience with NT1. Interviews included open-ended questions and probes on symptoms and impacts informed by a targeted literature review. Participants rated bothersomeness (0-10) for current symptoms and impacts and reported their 3 most bothersome symptoms. Concept frequencies and bothersomeness ratings were used to evaluate salience (ie, reported by $\geq 50\%$ of participants and average bothersomeness rating ≥ 5) and develop a conceptual disease model.

Results: Participants identified 30 symptoms and 38 impacts; 12 symptoms and 10 impacts were deemed salient. The most frequently reported salient symptoms included chronic daytime sleepiness (100%; mean [SD] bothersomeness: 7.4 [1.9]), unintentional daytime sleep episodes (100%; 7.2 [2.0]), memory problems (95%; 7.8 [2.2]), brain fog (85%; 7.9 [1.5]), excessive napping (85%; 6.6 [1.9]), automatic behaviors (70%; 5.7 [3.1]), difficulty concentrating (70%; 7.8 [2.1]), and sleep inertia (65%; 7.0 [2.7]). Chronic daytime sleepiness, brain fog, cataplexy, and memory problems were most frequently mentioned among the 3 most bothersome symptoms. Salient impacts included difficulties with planning/attending social events (90.0%; mean [SD] bothersomeness: 7.0 [2.8]), work (75%; 8.5 [1.5]), school (55%; 8.0 [1.7]), and driving (100%; 6.6 [3.3]), as well as negative impacts on relationships (50%; 7.4 [2.7]) and feeling anxious (60%; 7.6 [2.1]).

Conclusion: Several core narcolepsy symptoms were frequently reported by participants with NT1 but did not reach the level of saliency, underscoring the importance of symptoms beyond the pentad (eg, cognitive symptoms, brain fog, and sleep inertia). Salient impacts affected activities of daily living and behavioral/emotional, school/work, and social domains. A conceptual disease model was developed to systematically capture the lived experiences of patients with NT1 and guide future research and interventions.

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0690

A CONCEPTUAL DISEASE MODEL OF THE SYMPTOMS AND IMPACTS OF NARCOLEPSY TYPE 2 FROM THE PATIENT PERSPECTIVECristina Casstevens¹, Kiran Maski², Nancy Foldvary-Schaefer³, Luis Ortiz⁴, Meagan Farrell⁵, Christina Graham⁵, Claire Mobley⁵, Emily Kim⁵, Mia Wraight¹, Jed Black⁶, Joshua Steiner¹, David Plante⁷¹Jazz Pharmaceuticals, ²Department of Neurology, Boston Children's Hospital, ³Sleep Disorders Center, Neurological Institute, Cleveland Clinic, ⁴Johns Hopkins All Children's Hospital, ⁵IQVIA, ⁶Stanford University Center for Sleep Sciences and Medicine, ⁷Department of Psychiatry, University of Wisconsin-Madison

Introduction: Narcolepsy type 2 (NT2) is characterized by excessive daytime sleepiness (EDS) alongside other diagnostically relevant symptoms, including disrupted nighttime sleep, sleep paralysis, and hypnagogic/hypnopompic hallucinations. This qualitative study amplifies the voices of patients to identify the most bothersome and meaningful symptoms and impacts of NT2.

Methods: Participants were recruited through a third-party recruitment vendor, patient advocacy groups, and a patient conference. Twenty adults diagnosed with NT2 completed concept-elicitation interviews discussing their experience with NT2. Interviews included open-ended questions and probes on topics informed by a targeted literature review. Participants rated bothersomeness (0–10) for current symptoms and impacts and reported their 3 most bothersome symptoms. Concept frequencies and bothersomeness ratings were used to evaluate salience (ie, reported by $\geq 50\%$ of participants and average bothersomeness rating ≥ 5) and develop a conceptual disease model.

Results: Participants identified 30 symptoms and 38 impacts of NT2; 17 symptoms and 13 impacts were deemed salient. The most frequently reported salient symptoms included chronic daytime sleepiness (100%; mean [SD] bothersomeness: 8.6 [1.6]), brain fog (95%; 8.3 [1.5]), memory problems (90%; 7.5 [1.6]), fatigue (90%; 8.2 [1.7]), excessive napping (85%; 6.3 [2.8]), unintentional daytime sleep episodes (85%; 8.5 [2.1]), difficulty concentrating (80%; 8.2 [1.5]), and sleep inertia (80%; 7.8 [1.8]). Chronic daytime sleepiness, fatigue, and brain fog were most frequently mentioned among the 3 most bothersome symptoms. Salient impacts included difficulties with instrumental activities of daily living (100%; mean [SD] bothersomeness: 6.7 [2.7]), work (90%; 8.2 [2.1]), planning social activities (85%; 6.7 [1.9]), recreational activities (65%; 6.4 [1.9]), and school (50%; 9.0 [1.7]), as well as stress (70%; 6.2 [1.7]) and negative impacts on relationships (80%; 6.5 [2.4]) and mobility (50%; 6.5 [1.5]).

Conclusion: The lived experience of NT2 is defined not only by EDS but also by fatigue, sleep inertia, and cognitive difficulties. Further, NT2 has a substantial impact on daily functioning and quality of life. A conceptual disease model was developed to offer a structured representation of the lived experiences of patients with NT2, providing a critical framework for understanding patient perspectives and guiding future research and interventions.

Support (if any): Jazz Pharmaceuticals

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0691

LONG PSG-MSLT IMPROVES DIAGNOSTIC ACCURACY FOR SEVERE IDIOPATHIC HYPERSOMNIA SYMPTOMS ACROSS MULTI-CENTER COHORT

Kiran Maski¹, Grace Wang², Tyler Blake³, Robert Thomas⁴, Maya Baruch⁴, Kelley Dunham⁵, Milena Pavlova⁶, Paramjai Sandhu⁶, Sanford Auerback⁷, Neil Dhruva⁷, Jennifer Worhach², Bo Zhang², Lynn Trotti³

¹Department of Neurology, Boston Children's Hospital, ²Boston Children's Hospital, ³Emory University, ⁴Beth Israel Deaconess Medical Center, ⁵Neurocare, ⁶Brigham and Women's Hospital, ⁷Boston Medical Center

Introduction: Diagnosing Idiopathic Hypersomnia (IH) remains challenging due to the limited feasibility and accuracy of objective tests specified in the ICSD-3TR. In the literature, the multiple sleep latency test (MSLT), using a cutoff of mean sleep latency

(MSL) ≤ 8 minutes, demonstrates poor validity and reliability. Actigraphy-based determination of total sleep time (TST) ≥ 11 hours is hindered by inaccurate detection of daytime sleep. Twenty-four-hour polysomnography (PSG) can more precisely assess sleep duration but is rarely feasible in routine clinical settings. To address these limitations, we evaluated a modified “long PSG-MSLT,” hypothesizing that aggregated TST across the extended protocol would more accurately identify individuals with severe IH symptoms than MSL alone.

Methods: The long PSG-MSLT was implemented for clinical IH evaluation across five U.S. sleep centers. Patients aged 15–45 years completed an extended overnight PSG (approximately 9–10 PM to 10 AM) followed by a four-nap MSLT, with the final nap allowing up to 60 minutes of sleep or natural awakening. Diagnostic accuracy for detecting severe IH symptoms—defined as Idiopathic Hypersomnia Severity Scale (IHSS) ≥ 26 —was assessed using receiver-operating characteristic (ROC) analysis.

Results: A total of 112 individuals (mean age 24.7 ± 7.4 years; 62.2% female) completed testing; 84% scored IHSS ≥ 26 . MSL demonstrated non-significant diagnostic accuracy (AUC = 0.66; 95% CI 0.53–0.79; $p = 0.06$), while aggregated TST showed significant accuracy (AUC = 0.79; 95% CI 0.69–0.90; $p < 0.0005$). An MSL ≤ 8 minutes showed poor sensitivity (23.2%) but high specificity (92.9%) and did not differentiate IHSS severity (Fisher's exact $p = 0.29$). Combining MSL ≤ 8 minutes and/or total sleep time ≥ 11 hours metrics improved sensitivity to 51% while maintaining high specificity (92.9%) and significantly distinguished IHSS severity groups (Fisher's exact $p = 0.002$).

Conclusion: The ICSD-3TR criterion of MSL ≤ 8 minutes lacks diagnostic accuracy for identifying individuals with severe IH symptoms and fails to differentiate symptom severity. The modified long PSG-MSLT provides a clinically feasible and more accurate diagnostic approach by capturing increased sleep need—a core feature of many people with IH.

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0692

USING MACHINE LEARNING TO PREDICT CLINICAL DIAGNOSIS OF IDIOPATHIC HYPERSOMNIA VS NARCOLEPSY TYPE 2 FROM POLYSOMNOGRAPHY

Matheus Araujo¹, Katherine Beshears², Jad El Ahdab³, Jinu Johnson³, Nancy Foldvary-Schaefer⁴

¹Cleveland Clinic, ²Cleveland Clinic Lerner College of Medicine,

³Cleveland Clinic Foundation, ⁴Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Differentiation between narcolepsy type 2 (NT2) and idiopathic hypersomnia (IH) is often challenging due to overlapping features and limitations of diagnostic testing. We used machine learning on routine PSG features to directly predict expert clinical diagnosis of IH versus NT2.

Methods: We conducted a manual chart review of patients undergoing MSLT for suspected central disorders of hypersomnolence (CDH). Only individuals classified clinically as IH or NT2 were included. Forty-five PSG metrics from final reports, including demographics, sleep architecture, and respiratory indices, were extracted. Missing values were imputed using the median (for numeric features) or the mode (for categorical features), and

features were standardized. Six machine-learning classifier techniques were evaluated using nested cross-validation (5-fold outer, 5-fold inner) with Optuna hyperparameter optimization (1,000 trials per inner fold). We used ANOVA with p -values < 0.05 within each fold for feature selection. SHAP values were used to quantify feature importance. T-test and chi-squared test were used to assess statistical significance between IH and NT2. Metrics are reported as mean (standard deviation).

Results: The cohort included 454 patients, $N=147$ (32%) with a clinical diagnosis of IH and $N=307$ (68%) with NT2. Overall age was 34.0 (13.1) years, BMI was 27.6 (6.6) kg/m^2 , 351 (77.3%) female, and 327 (72.0%) Caucasian. Sex distribution differed between IH and NT2 (female 81.4% vs 68.7%). Within the clinically defined IH and NT2 cohort, agreement with ICSD-3 diagnoses was 58% for IH, 67% for NT2, and 61% overall. The logistic regression classifier achieved the best performance, with an AUC-ROC of 66% (5%) and a balanced accuracy of 63% (4%). Using a 60% probability threshold for NT2, precision was 49% (8%), sensitivity was 36% (6%), and specificity was 82% (4%). The SHAP analysis indicated that the features most strongly associated with NT2 were shorter REM latency ($p < 0.001$), lower non-REM sleep time ($p = 0.003$), higher sleep efficiency in the supine position ($p = 0.023$), and male sex ($p = 0.014$).

Conclusion: ICSD-3 (MSLT-based) diagnoses show poor agreement with expert clinical diagnoses of NT2/IH, highlighting the limitations of current diagnostic criteria and the need for alternative diagnostic modalities. Machine learning models applied to routine PSG features provide only moderate differentiation between NT2 and IH.

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0693

DEMOGRAPHICS AND DISEASE CHARACTERISTICS AMONG PEDIATRIC PATIENTS WITH NARCOLEPSY

Kiran Maski¹, Anne Morse², Sally Ibrahim³, Rakesh Bhattacharjee⁴, Judith Owens⁵, Luis Ortiz⁶, Gary Feldman⁷, Narong Simakajornboon⁸, Joshua Henderson⁹, Jennifer Gudeman¹⁰, Brian Abaluck¹⁰, Femida Gwady-Sridhar⁹

¹Department of Neurology, Boston Children's Hospital, ²Geisinger Medical Center, Janet Weis Children's Hospital, ³Case Western Reserve and University Hospitals Cleveland Medical Center, ⁴University of California San Diego, ⁵Boston Children's Hospital, ⁶Johns Hopkins All Children's Hospital, ⁷Ocean Sleep Medicine, ⁸Cincinnati Children's Hospital Medical Center, ⁹Pulse Inframe, ¹⁰Avadel Pharmaceuticals

Introduction: Narcolepsy is a chronic disorder, with symptom onset frequently occurring between ages 10-25 years. Clinical and demographic information is lacking in pediatric patients with narcolepsy. It is particularly important to understand the path to diagnosis for pediatric patients with narcolepsy, as missed or delayed diagnosis may have adverse effects on quality of life and impact social and academic development. This study was conducted to better understand this population, including the prevalence of narcolepsy subtypes, time from symptom onset to diagnosis, and patterns of medication use.

Methods: A retrospective review of Pulse Inframe registry data of patients aged ≤ 18 years with a diagnosis of narcolepsy type 1 (NT1) or 2 (NT2) from 22 US hospitals between 2009-2017 was conducted. All patients included in the analysis had undergone a

clinical evaluation, an overnight polysomnographic study, and a Multiple Sleep Latency Test. Data were analyzed descriptively.

Results: In total, 471 pediatric patients were identified in the dataset (NT1, 70.3%; NT2, 29.5%; unknown narcolepsy type, 0.2%; female, 47.6%; white, 48.2%; Black, 41.2%; non-Hispanic, 89.4%). The most reported Tanner stage classifications were stage 1 ($n=79$ [16.8%]) and stage 5 ($n=55$ [11.7%]); 48.9% ($n=235$) of classifications were not available. The median (IQR) ages at the onset of excessive daytime sleepiness (EDS) and at diagnosis were 9.0 (6.9-12.5) years and 12.0 (8.5-15.0) years, respectively. Mean (SD) Epworth Sleepiness Scale for Children and Adolescents (ESS-CHAD) scores in patients before treatment were 17.8 (4.5). Over half of the patients reported restless sleeping (62.6%), sleep maintenance problems (58.4%), sleep talking (57.3%), and snoring (54.4%). The most frequently reported comorbidity was excessive weight gain (48.4%). Prior treatments included stimulants (87.9%), wake-promoting agents (69.4%), and antidepressants (50.7%); 30.6% had tried sodium oxybate.

Conclusion: In this pediatric dataset, most patients reported a delay of ~ 3 years from symptom onset to narcolepsy diagnosis, with NT1 being a more prevalent diagnosis than NT2, and a wide range of pubertal developmental stages at diagnosis was observed. ESS-CHAD scores reflected substantial levels of EDS; sleep-related symptoms were also common in these patients. These findings emphasize the need for timely diagnosis and access to effective treatments for these patients.

Support (if any): Avadel Pharmaceuticals

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0694

POLYSOMNOGRAPHIC FINDINGS IN PEDIATRIC PATIENTS WITH NARCOLEPSY TYPE 1 AND NARCOLEPSY TYPE 2: A RETROSPECTIVE REVIEW

Sally Ibrahim¹, Kiran Maski², Anne Morse³, Rakesh Bhattacharjee⁴, Judith Owens⁵, Luis Ortiz⁶, Gary Feldman⁷, Narong Simakajornboon⁸, Joshua Henderson⁹, Jennifer Gudeman¹⁰, Brian Abaluck¹⁰, Femida Gwady-Sridhar⁹

¹Case Western Reserve and University Hospitals Cleveland Medical Center, ²Department of Neurology, Boston Children's Hospital, ³Geisinger Medical Center, Janet Weis Children's Hospital, ⁴University of California San Diego, ⁵Boston Children's Hospital, ⁶Johns Hopkins All Children's Hospital, ⁷Ocean Sleep Medicine, ⁸Cincinnati Children's Hospital Medical Center, ⁹Pulse Inframe, ¹⁰Avadel Pharmaceuticals

Introduction: There are few large polysomnographic datasets for children and adolescents with narcolepsy type 1 (NT1) and 2 (NT2). This analysis aims to characterize daytime and nighttime sleep features in pediatric patients with NT1 and NT2.

Methods: A retrospective review of Pulse Inframe registry data of patients aged ≤ 18 years with a diagnosis of NT1 or NT2 from 22 US hospitals between 2009 and 2017 was performed. All included patients underwent a clinical evaluation, Multiple Sleep Latency Test (MSLT), and overnight polysomnography (PSG). Data were analyzed descriptively.

Results: In total, 471 patients were identified (NT1, 70%; NT2, 30%; male, 52%; white, 48%). MSLT: median (IQR) sleep latency was 2.1 (1.0-3.9) minutes for patients with NT1 ($n=308$) and 3.5 (1.7-5.6) minutes for those with NT2 ($n=136$). Median (IQR) sleep-onset rapid eye movement (REM) periods (SOREMPs) were 4.0 (3.0-4.0) for patients with NT1 and 4.0 (3.0-4.0) for those with NT2.

PSG: respective median (range) N1 percentage and time were 8% (0%-44%) and 35.9 (0-188.3) minutes for patients with NT1 and 7% (0%-32%) and 32.5 (0-152.6) minutes for those with NT2. Respective median (range) N2 percentage and time were 49% (19%-82%) and 218.7 (3.2-427.3) minutes for patients with NT1 and 50% (16%-80%) and 237.0 (69.1-426.1) minutes for those with NT2. Respective median (range) N3 percentage and time were 21% (1%-63%) and 98.6 (2.5-354.2) minutes for patients with NT1 and 20% (2%-54%) and 98.7 (6.5-240.8) minutes for those with NT2. Respective median (range) REM percentage and latency were 19% (0%-41%) and 90.1 (0-234.2) minutes for patients with NT1 and 22% (2%-40%) and 100.0 (7.2-226.0) minutes for those with NT2. Median (range) arousals per hour were 12.6 (0-65.0) for patients with NT1 and 11.0 (0.1-38.4) for those with NT2.

Conclusion: Treatment of narcolepsy is often solely focused on daytime symptoms; however, sleep latency and SOREMP data point to NT1 and NT2 ultimately being disorders of both sleep and wake. Future research and patient care should consider the 24/7 nature of narcolepsy.

Support (if any): Avadel Pharmaceuticals

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0695

DEMOGRAPHICS AND COMORBIDITIES OF PATIENTS WITH NARCOLEPSY: A PROPENSITY SCORE-MATCHED COHORT STUDY

Marjorie Soltis¹, Melissa Lipford², Allison Smither³, Jennifer Gudeman⁴

¹Duke University, ²Mayo Clinic, ³inference, ⁴Avadel Pharmaceuticals

Introduction: Narcolepsy is a rare, chronic sleep disorder associated with decreased quality of life and multiple comorbid conditions, including sleep-related and psychiatric or mood disorders. This study used aggregate electronic health record (EHR) data to characterize the demographics and comorbidities of patients with narcolepsy.

Methods: An EHR-based search identified first-time Duke Health patients between January 1, 2012, and March 31, 2024. Included patients had ≥ 1 narcolepsy-specific ICD-9 (347.*) and ICD-10 (G47.4*) codes and ≥ 1 disease-supportive statement in clinical notes, identified using a natural language processing algorithm. A control cohort was propensity-matched for birth year, age at first institutional encounter, sex, race, number of diagnosis code instances, and mortality. Common comorbidities were compared and ranked between cohorts by odds ratio (OR). Statistical significance was determined using a chi-squared test; P values were corrected for multiple comparisons using Bonferroni correction.

Results: Within the EHR database of 2,617,188 patients, 1659 patients with a narcolepsy diagnosis were identified (mean age at first presentation, 32.4 years; white, 69%; female, 69%); the propensity-matched control cohort included 1659 patients (mean age at first presentation, 32.3 years; white, 69%; female, 69%). Comorbidities that occurred statistically significantly more frequently (all $P < 0.0001$) among the narcolepsy vs control cohort (OR [95% CI]) included sleep disorders: sleep-related movement disorders (26.26 [10.71-64.40]), hypersomnia (16.56 [12.54-21.87]), and circadian rhythm sleep disorders (15.43 [6.73-35.38]); psychiatric or mood disorders: posttraumatic stress disorder (3.08 [2.10-4.52]), attention deficit hyperactivity disorder (2.90 [2.28-3.68]), and depression (2.66 [2.27-3.11]); and pain disorders: trigeminal neuralgia (6.63 [2.80-15.70]), fibromyalgia (5.30 [3.58-7.85]),

and chronic pain syndrome (3.37 [2.46-4.61]). Postural orthostatic tachycardia syndrome occurred statistically significantly more frequently ($P < 0.0001$) in the narcolepsy vs control cohort (7.24 [3.59-14.61]).

Conclusion: Consistent with prior EHR research, sleep, psychiatric, mood, and pain disorders were among the most frequently reported comorbidities of patients with narcolepsy. The results of this analysis of real-world demographic and clinical information of patients with narcolepsy may further inform clinicians of the most relevant concomitant disease states to consider when evaluating potential therapies.

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0696

LIFESTYLE FACTORS IN NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA

Lamia Festic¹, Joseph Cheung²

¹University of Florida, ²Mayo Clinic Jacksonville

Introduction: Narcolepsy and idiopathic hypersomnia (IH) are characterized by excessive daytime sleepiness. They can be caused by deficiency of orexin/hypocretin, a neuropeptide that regulates sleep and wakefulness. It is estimated that 1 in 2000 people in the United States of America have been diagnosed with some form of narcolepsy or idiopathic hypersomnia. Around the world, about 3 million people are narcoleptic. Little data are available regarding the lifestyle factors in these patients. In this study, we sought to find whether lifestyle factors, including diet and physical activity are associated with the severity of sleepiness in narcolepsy and idiopathic hypersomnia.

Methods: We collaborated with "Hypersomnia Foundation" and "Wake Up Narcolepsy" who distributed our survey to their subscribers. The survey consisted of a series of four short subsurveys asking about the substance use, diet (MiniEAT screen), exercise (IPAQ questionnaire), and daytime sleepiness (Epworth Sleepiness Scale). The survey was anonymous and included baseline characteristics, diagnosis (Narcolepsy type 1 (NT1), Narcolepsy type 2 (NT2), or Idiopathic Hypersomnia (IH)). We considered hypersomnolence and moderate to severe hypersomnolence to be present if ESS > 10 and ≥ 15 , respectively.

Results: We received total of 377 individual responses. Of those, 191 responders had IH, 97 had NT1 and 89 had NT2. Median age was 31 (25, 42) and 323 identified as females, 44 males and 10 others. Median ESS was 15 (12, 18), where 285 responders had ESS > 10 (76%) and 194 (51%) had ESS ≥ 15 . The responders with NT1 had significantly higher median ESS: 17 (12,19), than NT2: 15 (10, 17), or IH: 15(12, 17) responders ($p < 0.01$). In multiple univariate analyses, none of the baseline characteristics, habits (smoking, alcohol or caffeine), dietary consumption (fruit, vegetable, legumes/nuts/seeds, whole or refined grains, dairy and fish/seafood) or exercise (vigorous, moderate or walking) had significant association with the degree of responders' subjective sleepiness.

Conclusion: Most survey responders continue to be excessively sleepy, particularly those with NT1. There were no apparent univariate associations of underlying hypersomnolence with the baseline characteristics, habits, diet and exercise levels. Disorders of central hypersomnolence are of complex nature without easily identifiable modifiers.

Support (if any): Mayo Clinic CRISP

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0697

NARCOLEPSY RISK SCREENING AT SCALE WITH MULTI-NIGHT PPGNathaniel Watson¹, Yoav Nygate², Sam Rusk², Chris Fernandez²¹University of Washington School of Medicine, Department of Neurology, ²EnsoData Research, EnsoData

Introduction: Narcolepsy is a devastating, often unrecognized CNS hypersomnia involving excessive daytime sleepiness, sleep disturbance, sleep paralysis, and hypnagogic and hypnopompic hallucinations. Cataplexy may or may not be present. Clinical hyperfocus on sleep-disordered breathing as the cause of excessive daytime sleepiness risks missing narcolepsy diagnoses. We aimed to address this problem by using multi-night data from photoplethysmography (PPG) based home sleep apnea tests (HSAT) to screen for narcolepsy.

Methods: EnsoSleep PPG (ePPG) is an FDA-cleared, interoperable, clinically validated software as a medical device (SaMD) HSAT. ePPG studies were scored via a machine learning (ML) based module trained by applying ML and statistical signal processing methods, including multiple deep neural networks, to a database of over 1,000,000 diagnostic polysomnograms with concurrently recorded PPG. Included studies had: ≥ 4 hours of total sleep time, test duration ≤ 10 hours, and ≥ 3 nights total monitoring per patient (Min 3, Max 30). Narcolepsy presence was defined as a mean sleep latency (MSL) ≤ 8 minutes averaged over the total number of HSAT nights and ≥ 2 sleep-onset REM periods (SOREMPS) over the total nights monitored.

Results: The study included N=19,074 patients with mean age (49.3 years, SD=13.6), mean BMI (31.3, SD=6.6) and sex 65% male and 35% female. Data came from 90 individual sleep centers. Means were: AHI 15.9 events/hour (SD=15.3), sleep duration 6.5 hours (SD=0.8), sleep latency 17.7 minutes (SD=14.1), and REM latency 99.2 minutes (SD=51.2). SOREMP frequency was: none (93.4%), one (5.4%), two (1.0%), three (0.1%) and four (0.1%). 4,050 (21.2%) patients had a MSL ≤ 8 minutes and < 2 SOREMPs, and 121 (0.6%) patients had ≥ 2 SOREMPs and MSL > 8 minutes. ePPG narcolepsy diagnostic criteria was met for 0.6% (N=105) of patients and not met for 99.4% (N=18,969).

Conclusion: Our multi-night based narcolepsy prevalence was similar to that expected for a sleep clinic population and indicates an opportunity to screen for narcolepsy at scale from HSATs. Multi-night ePPG testing could offer similar insights to MSLTs without the corresponding operational overhead or burden. Further SaMD development of multi-night HSAT in narcolepsy patients offers the possibility of an at home narcolepsy test (HNT).

Support (if any):

Abstract citation ID: zstag091.0697

0698

REAL-WORLD EXPERIENCE AND IMPACT OF COGNITIVE IMPAIRMENT IN NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA: SURVEY RESULTS FROM THE ASPIRE STUDYMichael Doane¹, Jane Lazar Tucker², Kristen McCausland², Lindsay Jesteadt³, Claire Wylds-Wright³¹Alkermes, Inc., ²IQVIA Quality Metric Inc., ³Sleep Consortium

Introduction: Cognitive impairment is a common and disruptive symptom of narcolepsy and idiopathic hypersomnia (IH) independent from sleepiness and often unaddressed by current treatments. We evaluated the association of cognitive impairment with work productivity and health-related quality of life (HRQoL) among those diagnosed with narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and IH.

Methods: The ASPIRE study was an online survey conducted among US adults who reported being diagnosed with NT1, NT2, or IH by a clinician (recruited via Rare Patient Voice, Hypersomnia Foundation, and Sleep Consortium). Participants completed the British Columbia Cognitive Complaints Inventory-Expanded Version (BC-CCI-E), including 6 items assessing cognitive impairment (concentration, memory, word finding, expressing thoughts, slow thinking, and problem-solving; scored 0-18, higher scores=greater impairment). Subgroups were defined as mild-to-severe (scored >4) versus no/minimal impairment (scored ≤ 4). Three additional BC-CCI-E items assessed impact of cognitive impairment on daily life. Work and activity impairment were measured using the Work Productivity and Activity Impairment Questionnaire: Specific Health Problem, assessing absenteeism, presenteeism, and activity impairment over the past week. HRQoL was assessed using EQ-5D-5L (scored 0-1; higher scores=better HRQoL) and EQ-Visual Analogue Scale (EQ-VAS) (scored 0-100; higher scores=better HRQoL).

Results: The sample included 366 participants (NT1=116; NT2=127; IH=123) with mean age ~ 40 y; $>80\%$ were female and 55% were employed. Approximately 60% of participants were treated with non-amphetamine wake-promoting agents. The mean BC-CCI-E score was 9.2 (SD=4.2); 89% reported mild-to-severe impairment. Most participants reported that cognitive impairment interfered with work (95%), daily activities (94%), and relationships (81%). Participants with mild-to-severe cognitive impairment reported greater activity impairment (65% vs 41%; $p < 0.001$) and work impairment (58% vs 25%; $p < 0.001$) vs those with no/minimal impairment. HRQoL scores were lower among those with cognitive impairment vs those with no/minimal cognitive impairment (EQ-5D-5L: 0.61 vs 0.85 [$p < 0.001$]; EQ-VAS scores: 58 vs 74 [$p < 0.001$]). Findings were consistent across NT1, NT2, and IH subgroups.

Conclusion: Cognitive impairment is prevalent among individuals with NT1, NT2, and IH, and is associated with detriments in work productivity, daily functioning, relationships, and overall HRQoL. These findings underscore a critical unmet need to address cognitive symptoms across these populations.

Support (if any): Alkermes, Inc.

Abstract citation ID: zstag091.0698

0699

REAL-WORLD EXPERIENCE AND IMPACT OF FATIGUE IN NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA: SURVEY RESULTS FROM THE ASPIRE STUDYMichael Doane¹, Jane Lazar Tucker², Kristen McCausland², Claire Wylds-Wright³, Lindsay Jesteadt³¹Alkermes, Inc., ²IQVIA Quality Metric Inc., ³Sleep Consortium

Introduction: Fatigue—characterized by exhaustion and low energy—is a common and disruptive symptom among people living with narcolepsy and idiopathic hypersomnia (IH). Patients distinguish fatigue from sleepiness, and fatigue often persists

despite treatment for excessive daytime sleepiness. This study evaluated the association of fatigue with work productivity and health-related quality of life (HRQoL) among those diagnosed with narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and IH.

Methods: The ASPIRE study was an online survey conducted among US adults who reported being diagnosed with NT1, NT2, or IH by a clinician (recruited via Rare Patient Voice, Hypersomnia Foundation, and Sleep Consortium). Participants completed the PROMIS-Fatigue Short-Form 6a (PROMIS-Fatigue), which measured fatigue severity over the past week (T-score range: 33.4-76.8; higher scores=more severe fatigue). Subgroups were defined as mild-to-severe fatigue (T-score ≥ 55) versus normal fatigue (T-score < 55). Work and activity impairment were measured using the Work Productivity and Activity Impairment Questionnaire: Specific Health Problem, which assessed absenteeism, presenteeism, and activity impairment over the past week. HRQoL was assessed using EQ-5D-5L (scored 0-1; higher scores=better HRQoL) and EQ-Visual Analogue Scale (EQ-VAS) (scored 0-100; higher scores=better HRQoL).

Results: The sample included 366 participants (NT1=116; NT2=127; IH=123) with mean age ~ 40 y. Over 80% were female and 55% were employed. Approximately 60% of participants were treated with non-amphetamine wake-promoting agents. The mean PROMIS-Fatigue score was 65.74 (SD=7.52), with 91% reporting mild-to-severe fatigue. Participants with mild-to-severe fatigue reported greater activity impairment (66% vs 28%; $p < 0.001$) and work impairment (59% vs 21%; $p < 0.001$) vs those with normal fatigue. Mean HRQoL scores were lower among those with mild-to-severe fatigue vs those with normal fatigue (EQ-5D-5L: 0.61 vs 0.88 [$p < 0.001$]; EQ-VAS: 58 vs 78 [$p < 0.001$]). Findings were consistent across NT1, NT2, and IH subpopulations.

Conclusion: In this general sample of NT1, NT2, and IH participants, an overwhelming majority reported mild-to-severe fatigue. Fatigue was associated with substantial impairments in daily functioning, work productivity, and HRQoL. Results suggest fatigue is a common and burdensome symptom regardless of disease subtype. These findings underscore the burden of fatigue and highlight the unmet need for effective treatments that address this debilitating symptom.

Support (if any): Alkermes, Inc.

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0700

RELATIVE PREVALENCE OF NARCOLEPSY TYPE 1, NARCOLEPSY TYPE 2, AND IDIOPATHIC HYPERSOMNIA: A CLAIMS DATABASE ANALYSIS

Rakesh Bhattacharjee¹, Michael Thorpy², Sarah Meskill³, Murad Assaad⁴, Anne Morse⁵, Jennifer Gudeman⁶, Brian Abaluck⁶

¹University of California San Diego, ²Albert Einstein College of Medicine, ³Tricoastal Narcolepsy and Sleep Disorder Center, ⁴Laureate Medical Group, ⁵Geisinger Medical Center, Janet Weiss Children's Hospital, ⁶Avadel Pharmaceuticals

Introduction: It is difficult to estimate exact prevalence rates of rare diseases, including central disorders of hypersomnolence (CDH). Retrospective claims data were used to estimate relative frequencies of narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and idiopathic hypersomnia (IH) and compare demographic trends across disorders.

Methods: Patients in the Komodo Health claims database with any diagnosis of NT1/NT2/IH (ie, ≥ 1 ICD-10 code [2022 or 2023])

were identified. Patients in the closed data set (ie, 100% claim availability [2018-2023]) and ≥ 1 claim for NT1/NT2/IH were included. Diagnosis was defined as ≥ 2 relevant ICD-10 codes ≥ 30 days apart. Patients with multiple, distinct CDH diagnoses were excluded. CDH prevalence in 2023 was calculated, and distribution of diagnoses by sex and age group were analyzed descriptively.

Results: The Komodo claims dataset included 154,750 patients with ≥ 1 NT1, NT2, or IH diagnosis in 2023. The prevalence of NT1, NT2, and IH was 9.4, 29.1, and 9.7 per 100,000 persons, respectively. Of the 154,750 patients, 114,961 were excluded because claim availability was incomplete from 2018-2023, and 13,786 were excluded for having multiple, distinct NT1/NT2/IH diagnoses. Thus, 26,003 patients were included in this analysis (NT1, 11%; NT2, 65%; IH, 24%). In total, 62% of patients were female (NT1, 65%; NT2, 60%; IH, 68%) and 36% were male (NT1, 34%; NT2, 39%; IH, 31%); 1% did not specify. Overall, 2% of patients were aged 0-17 years (NT1, 5%; NT2, 2%; IH, 2%), 9% were aged 18-24 years (NT1, 15%; NT2, 8%; IH, 9%), 11% were aged 25-34 years (NT1, 13%; NT2, 11%; IH, 12%), 20% were aged 35-44 years (NT1, 20%; NT2, 20%; IH, 22%), 42% were aged 45-64 years (NT1, 36%; NT2, 42%; IH, 43%), and 15% were aged ≥ 65 years (NT1, 12%; NT2, 17%; IH, 11%).

Conclusion: Exclusion of patients with uncertain diagnoses provides a complementary perspective in assessing relative frequencies of CDH. NT2 was diagnosed approximately 6 times more frequently than NT1 and nearly 3 times more frequently than IH. Limitations of objective tests, including polysomnography and multiple sleep latency testing in NT2 and IH, underscore the need to prioritize clinical assessments for diagnosis of CDH.

Support (if any): Avadel Pharmaceuticals

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0701

SPONTANEOUS LONG-TERM RESOLUTION OF DAYTIME SLEEPINESS IN ADULTS DIAGNOSED WITH NARCOLEPSY TYPE 2: A CASE SERIES

Zhanna Fast, Martina Vendrame, Dimitri Markov

Thomas Jefferson University Hospital

Introduction: Narcolepsy Type 2 (NT2) is traditionally considered a chronic lifelong disorder characterized primarily by excessive daytime sleepiness (EDS). However, long-term evolution of symptoms in NT2 remains poorly understood. We present three cases of patients diagnosed with NT2 in early adulthood who experienced complete resolution of EDS approximately 15 years after diagnosis.

Methods: A retrospective chart review was conducted of three patients diagnosed with NT2 in their 30s following overnight polysomnography and multiple sleep latency testing. Demographic information, clinical presentation, psychiatric history, treatment course, and long-term outcomes were reviewed. Current clinical status was confirmed at follow-up sleep clinic visits.

Results: All three patients were diagnosed with NT2 approximately 15 years prior and initially presented with significant daytime sleepiness impacting daily functioning. At the time of diagnosis, each patient also exhibited symptoms of depression and was receiving treatment with antidepressant medications. Over time, all three demonstrated gradual and eventually complete resolution of daytime sleepiness without ongoing pharmacologic treatment for NT2. At most recent follow-up, none required stimulant therapy, and all were functioning without

daytime impairment. The improvement in symptoms correlated with stabilization of mood over time.

Conclusion: This case series suggests that symptoms of NT2, particularly excessive daytime sleepiness, may spontaneously resolve over the course of a lifetime in a subset of patients. The coexistence of depressive symptoms at the time of diagnosis raises the possibility that mood disorders and associated fatigue may contribute to the clinical presentation of NT2, potentially leading to diagnostic overlap or misattribution. Longitudinal studies are needed to better characterize the natural history of NT2 and the influence of comorbid psychiatric conditions on long-term outcomes.

Support (if any):

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0702

SYMPTOM BURDEN AND QUALITY OF LIFE IN PATIENTS WITH NARCOLEPSY WHO EXPERIENCE RESIDUAL CATAPLEXY: SUBGROUP ANALYSIS FROM THE CRESCENDO SURVEY

Michael Thorpy¹, Graham Eglit², Samantha Floam², Herriot Tabuteau²

¹Albert Einstein College of Medicine, ²Axsome Therapeutics, Inc.

Introduction: Narcolepsy type 1 (NT1; narcolepsy with cataplexy) is a chronic disease which often requires multiple treatments to address its symptoms. Although cataplexy is a core symptom of narcolepsy, it often goes underrecognized and can cause limitations to daily life. The CRESCENDO survey evaluated the experience of treated patients with NT1. Here we conducted a subgroup analysis of respondents reporting residual cataplexy to better understand the burden and impact on quality of life (QoL). **Methods:** CRESCENDO was developed in partnership with the Narcolepsy Network, conducted (October–December 2023) by a third-party research firm, and included adults diagnosed with NT1 currently taking FDA-approved narcolepsy medication.

Results: Patients reporting residual cataplexy (n=156; 76.8%) were older (median age 42.0 vs 38.0 yrs) and more likely to identify as White (76.3% vs 51.1%) and female (70.5% vs 42.6%), compared with those reporting no residual cataplexy (n=47). Polypharmacy was more common in the residual cataplexy group (65.4%) compared with the no residual cataplexy group (44.7%). The residual cataplexy group was more likely to be currently treated with antidepressants (42.9 % vs 23.4%) and less likely to be currently treated with oxybates (42.3% vs 61.7%). Patients with residual cataplexy reported greater subjective cognitive impairment (mean BC-CCI score 9.1 vs 5.2), depressive symptoms (mean PHQ-8 score 10.5 vs 7.0), and EDS (mean ESS score 13.6 vs 8.9). Patients with residual cataplexy also reported greater burden related to cognitive (any difficulty with work/school [92.9% vs 83.0%], family/friends relationship [80.8% vs 61.7%], or social activity enjoyment [88.5% vs 66.0%]) and depressive (48.7% vs 34.0% reporting very/extreme difficulty with work/home/social life) symptoms. Other residual symptoms were more frequently self-reported in the residual cataplexy group (EDS, 94.9% vs 78.7%; brain fog 87.2% vs 44.7%; depression 50.0% vs 29.8%).

Conclusion: Despite current treatment, residual cataplexy was common among patients with NT1, affecting a majority of NT1 patient survey respondents. These patients reported a substantial symptom burden and reduced QoL. There is prevailing unmet

need for additional treatment options to treat cataplexy and improve outcomes in this population.

Support (if any): Axsome Therapeutics Inc.

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0703

IMPACT OF ECONOMIC STATUS ACROSS RACE AND ETHNICITY ON NARCOLEPSY TREATMENT ACCESS: A CLAIMS DATABASE ANALYSIS

Rakesh Bhattacharjee¹, Alec Platt², Heidy Merius³, Omavi Bailey⁴, Jennifer Gudeman⁵, Johanna Hertel⁵, Brian Abaluck⁵

¹University of California San Diego, ²Respiratory Specialists,

³Stony Brook Medicine, ⁴Biorhythms, ⁵Avadel Pharmaceuticals

Introduction: Narcolepsy type 1 (NT1) and type 2 (NT2) affect patients of diverse backgrounds.

Methods: The Komodo Health claims database was used to identify patients with exactly 1 valid NT1 or NT2 diagnosis (ie, ≥2 relevant ICD-10 codes 30 days apart) prior to 2023 and 100% observable claims in 2023. Multiple separate NT1 or NT2 diagnoses or a single diagnosis with 1 claim in 2023 was exclusionary. Proportions of patients who received gold-standard narcolepsy treatment (ie, 2021 American Academy of Sleep Medicine strong recommendations [modafinil, pitolisant, solriamfetol, sodium oxybate], other oxybates, and armodafinil), oxybate treatment, or no treatments for excessive daytime sleepiness (EDS) in 2023 were calculated by self-reported race and ethnicity, and national income tercile.

Results: The closed data set included 30,563 patients with a single NT1 or NT2 diagnosis (NT1, 15%; NT2, 85%); of these, 16,389 patients had race and ethnicity data and income data available. Gold-standard narcolepsy treatments were received by 41% of Black/African American, 44% of Hispanic/Latino, and 48% of white patients. Oxybate treatment was received by 5% of Black/African American, 8% of Hispanic/Latino, and 8% of white patients. EDS treatments were not received by 35% of Black/African American, 28% of Hispanic/Latino, or 21% of white patients. The greatest proportions of patients who received gold-standard narcolepsy treatments were in the upper income tercile (lower, middle, upper terciles, respectively: Black/African American, 40%, 44%, 49%; Hispanic/Latino, 41%, 47%, 53%; white, 45%, 50%, 53%). The greatest proportions of patients who received oxybate treatment were in the upper income tercile (lower, middle, upper terciles, respectively: Black/African American, 4%, 7%, 8%; Hispanic/Latino, 7%, 8%, 10%; white, 6%, 7%, 11%). The lowest income tercile had the greatest proportion of patients not receiving EDS treatments (lower, middle, upper terciles, respectively: Black/African American, 39%, 36%, 30%; Hispanic/Latino, 31%, 28%, 22%; white, 23%, 20%, 19%).

Conclusion: These results reflect disparities in narcolepsy treatment, as patients in racial and ethnic groups consistently did not receive gold-standard treatments, regardless of income level.

Support (if any): Avadel Pharmaceuticals

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0704

IMPACT OF SEX AND RACE ON TREATMENT OF NARCOLEPSY: A CLAIMS DATABASE ANALYSIS

Rakesh Bhattacharjee¹, Alec Platt², Cecile Martin³, Jennifer Gudeman⁴, Johanna Hertel⁴, Brian Abaluck⁴

¹University of California San Diego, ²Respiratory Specialists,

³FusionSleep, ⁴Avadel Pharmaceuticals

Introduction: Narcolepsy impacts patients across sex, race, and ethnicity. A retrospective analysis of claims data was conducted to characterize narcolepsy treatment patterns in men and women of different races and ethnicities.

Methods: Patients with exactly 1 valid narcolepsy type 1 (NT1) or 2 (NT2) diagnosis prior to 2023 whose claims were 100% observable in 2023 were identified in the Komodo Health claims database. Valid diagnosis was defined as ≥ 2 relevant ICD-10 codes 30 days apart. Patients were excluded for multiple separate NT1 or NT2 diagnoses or a single diagnosis supported by only 1 claim in 2023. The proportions of patients who received gold-standard narcolepsy treatment per 2021 American Academy of Sleep Medicine strong recommendations (ie, [modafinil, pitolisant, solriamfetol, sodium oxybate], other oxybates, and armodafinil), oxybate treatment, or no treatments for excessive daytime sleepiness (EDS) in 2023 were calculated. Treatment patterns were stratified by race and ethnicity, and sex.

Results: The closed claims data set included 30,563 patients with a NT1 or NT2 diagnosis; 21,714 of these patients had race and ethnicity data and sex data available. Receipt of gold-standard narcolepsy treatments was lowest among Black or African American male patients (female, 42%; male, 41%) compared with Hispanic or Latino patients (female, 43%; male, 46%) and white patients (female, 47%; male, 51%). Black or African American female patients (female, 5%; male, 7%) were least likely to receive treatment with an oxybate compared with Hispanic or Latino patients (female, 9%; male, 6%) and white patients (female, 8%; male, 7%). Black or African American male patients (female, 35%; male 36%) were most likely to not receive an EDS treatment compared with Hispanic or Latino patients (female, 28%; male, 29%) and white patients (female, 21%; male, 22%).

Conclusion: These data demonstrate disparities in gold-standard narcolepsy treatment for Black or African American female and male patients compared with patients of other races and ethnicities. Despite being approved by the US Food and Drug Administration for narcolepsy, oxybate use was consistently low across race and ethnicity groups.

Support (if any): Avadel Pharmaceuticals

Abstract citation ID: **zsag091.0704**

0705

TREATMENT ACCESS FOR NARCOLEPSY ACROSS PATIENT DEMOGRAPHIC CHARACTERISTICS: A CLAIMS DATABASE ANALYSIS

Alec Platt¹, Rakesh Bhattacharjee², Maggie Lavender³, Amber Burns⁴, Jennifer Gudeman⁵, Johanna Hertel⁵, Brian Abaluck⁵

¹Respiratory Specialists, ²University of California San Diego,

³Comprehensive Sleep Medicine Associates, ⁴Bassett Healthcare,

⁵Avadel Pharmaceuticals

Introduction: Given the chronic nature of and diverse patient populations affected by narcolepsy type 1 (NT1) and type 2 (NT2), retrospective claims data were analyzed to characterize narcolepsy treatment access among different race/ethnicity and age groups.

Methods: Patients with exactly 1 valid NT1 or NT2 diagnosis (ie, ≥ 2 relevant ICD-10 codes 30 days apart) prior to 2023 and 100% observable claims in 2023 were identified in the Komodo Health

claims database. Multiple separate NT1 or NT2 diagnoses or a single diagnosis with 1 claim in 2023 were exclusionary. Proportions of patients who received gold-standard narcolepsy treatment (ie, 2021 American Academy of Sleep Medicine strong recommendations [modafinil, pitolisant, solriamfetol, sodium oxybate], other oxybates, armodafinil), oxybate treatment, or no treatments for excessive daytime sleepiness (EDS) are presented by self-reported race (Black or African American [Black/AA] or white)/ethnicity (Hispanic or Latino [Hispanic/Latino]), and age.

Results: A total of 30,563 patients (NT1=15%; NT2=85%) with 1 NT1 or NT2 diagnosis were included in the closed data set. Race/ethnicity and age data were available for 22,010 patients (Black/AA, n=2685 [12.2%]; Hispanic/Latino, n=1871 [8.5%]; white, n=17,454 [79.3%]). Gold-standard narcolepsy treatments were received by 29% of patients aged 0-17y (Black/AA=23%; Hispanic/Latino=17%; white=40%), 48% aged 18-24y (Black/AA=38%; Hispanic/Latino=50%; white=51%), 52% aged 25-34y (Black/AA=43%; Hispanic/Latino=49%; white=54%), 49% aged 35-44y (Black/AA=47%; Hispanic/Latino=46%; white=49%), 49% aged 45-64y (Black/AA=41%; Hispanic/Latino=45%; white=51%), and 42% aged ≥ 65 y (Black/AA=40%; Hispanic/Latino=39%; white=42%). Oxybate treatment was received by 11% of patients aged 0-17y (Black/AA=11%; Hispanic/Latino=7%; white=13%), 12% aged 18-24y (Black/AA=7%; Hispanic/Latino=14%; white=13%), 12% aged 25-34y (Black/AA=9%; Hispanic/Latino=9%; white=13%), 11% aged 35-44y (Black/AA=6%; Hispanic/Latino=10%; white=11%), 8% aged 45-64y (Black/AA=6%; Hispanic/Latino=7%; white=8%), and 3% aged ≥ 65 y (Black/AA=2%; Hispanic/Latino=2%; white=3%). Patients who did not receive EDS treatment included 31% of patients aged 0-17y (Black/AA=28%; Hispanic/Latino=40%; white=29%), 22% aged 18-24y (Black/AA=30%; Hispanic/Latino=28%; white=18%), 20% aged 25-34y (Black/AA=34%; Hispanic/Latino=23%; white=17%), 18% aged 35-44y (Black/AA=29%; Hispanic/Latino=24%; white=16%), 22% aged 45-64y (Black/AA=37%; Hispanic/Latino=30%; white=19%), and 31% aged ≥ 65 y (Black/AA=42%; Hispanic/Latino=36%; white=29%).

Conclusion: Across age groups, patients in racial/ethnic groups received fewer gold-standard narcolepsy treatments than white patients. Additionally, pediatric patients aged 0-17y and senior patients aged ≥ 65 y were the least treated, highlighting potential gaps in care.

Support (if any): Avadel Pharmaceuticals

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0706

CLINICAL AND PSYCHIATRIC PREDICTORS OF OBJECTIVE SLEEP LATENCY IN IDIOPATHIC HYPERSOMNIA AND RELATED DISORDERS: A RETROSPECTIVE COHORT ANALYSIS

Nazia Naz Khan¹, Shivani Saini², Ling Wang¹, Vishal Saini¹

¹Michigan State University, ²Hurley Medical Center

Introduction: Idiopathic hypersomnia (IH) and other central hypersomnolence disorders present diagnostic challenges due to heterogeneous symptoms, psychiatric comorbidities, and wide variability in patients' sleep patterns. Understanding predictors of sleep latency may improve diagnostic precision and help distinguish hypersomnolence from circadian or psychiatric contributors. This study examined demographic, psychiatric, behavioral,

and sleep-related factors associated with mean sleep latency in a real-world clinical cohort.

Methods: We conducted a retrospective analysis of adult patients who underwent multiple sleep latency testing (MSLT) for hypersomnolence evaluation between January 2000 and May 2025 at a tertiary sleep center in Lansing, Michigan. We excluded patients with untreated or inadequately treated obstructive sleep apnea (residual apnea-hypopnea index (AHI) >5/hours) and those with total sleep time < 6 hours on the preceding night. The study was approved by the Michigan State University Institutional Review Board. Descriptive statistics were generated for demographic, clinical, and polysomnographic variables. Multivariable linear regression was used to identify predictors of mean sleep latency.

Results: Participants were predominantly female (76.7%), Caucasian (83.7%), and employed (67.4%). Mean age was 36.4 ± 14.2 years, BMI 28.3 ± 6.9 kg/m², sleep latency 8.7 ± 4.2 minutes, and total sleep time 402 ± 28 minutes. Idiopathic hypersomnia was present in 95.4% of the cohort, and 4.7% had narcolepsy. Psychiatric comorbidities were common, including major depression (52%), anxiety (53.5%), and dysthymia (23.3%). Circadian rhythm disorder was associated with an average 6.8-minute increase in sleep latency (95% CI: 2.68–10.94; $p = 0.02$). Central hypersomnolence disorders showed a non-significant trend toward shorter latency (–6 minutes; $p = 0.13$), consistent with expected patterns in narcolepsy-spectrum presentations. No meaningful associations were found for age, sex, BMI, depression, anxiety, attention deficit hyperactivity disorder, cataplexy, or alcohol/drug use.

Conclusion: Circadian rhythm disorder was the strongest predictor of prolonged sleep latency, underscoring the importance of evaluating circadian misalignment when interpreting MSLT results in suspected IH. The substantial psychiatric burden observed underscores the importance of concurrent mental health assessment. Overall, the results point to specific clinical characteristics that may help clinicians differentiate sleepiness related to IH, narcolepsy-spectrum symptoms, and circadian rhythm problems.

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0707

VALIDATION OF THE HYPERSOMNIA SEVERITY INDEX IN HYPERSOMNOLENCE DISORDER

Jessica Love¹, Jesse Cook², Katherine Kaplan³, Meredith Rumble¹, David Plante⁴

¹University of Wisconsin, Madison, ²University of Wisconsin-Madison, School of Medicine and Public Health, Department of Psychiatry, ³Stanford University, ⁴Department of Psychiatry, University of Wisconsin, Madison

Introduction: Hypersomnolence, defined as excessive daytime sleepiness with normal or prolonged sleep duration, is a common problem encountered in sleep medicine. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision categorizes unexplained hypersomnolence as hypersomnolence disorder (HD). The Hypersomnia Severity Index (HSI) was developed to assess the severity and impairment of hypersomnolence, yet no previous validation has been performed in patients experiencing unexplained hypersomnolence. As such, this investigation systematically examined the HSI's psychometric properties in a clinical sample of unexplained HD.

Methods: Archival data from unmedicated research participants and clinic patients ($n = 179$; average age = 27.8 ± 6.99 years;

percent female = 77.7 %) were utilized for this validation. A comprehensive analysis of psychometric properties was performed to assess the validity (factorial, construct, and criterion) and reliability (internal consistency and test-retest) of the HSI. Receiver operating characteristic (ROC) analysis was utilized to identify a threshold that differentiated HD from non-HD participants.

Results: The HSI demonstrated strong psychometric properties. Internal consistency was excellent (Cronbach's $\alpha = 0.92$), with item-total correlations satisfactory across all items. Factor analysis confirmed a two-factor structure. Convergent and concurrent validity were evidenced by significant associations between the HSI and established measures of hypersomnolence ($r = -0.63$ to 0.84 ; $r = -0.26$ to 0.35). Discriminant validity was supported by weak or nonsignificant correlations with unrelated constructs ($r = 0.15$ to 0.25). Test-retest reliability over a one-year period was strong ($r = 0.89$), and a cutoff of ≥ 15 best differentiated HD from non-HD participants.

Conclusion: This investigation demonstrates the validity and reliability of the HSI in HD. While additional research is warranted, our findings support the use of this instrument in HD for both clinical and research purposes. Ultimately, the use of a validated instrument in HD will advance research in this important but understudied area of sleep disorders.

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0708

IDENTIFYING CORE SLEEP FEATURES OF IDIOPATHIC HYPERSOMNIA USING A MULTIMODAL POLYSOMNOGRAPHIC-MSLT APPROACH AND PRINCIPAL COMPONENT ANALYSIS

Grace Wang¹, Maya Baruch², Kelley Dunham³, Robert Thomas², Jennifer Worhach¹, Kiran Maski⁴

¹Boston Children's Hospital, ²Beth Israel Deaconess Medical Center, ³Neurocare, ⁴Department of Neurology, Boston Children's Hospital

Introduction: Many experts believe that Idiopathic Hypersomnia (IH) should be subtyped based on sleep duration but limited data are available to support such delineation. To characterize physiologic sleep features within the IH diagnosis, we evaluated polysomnography (PSG) and multiple sleep latency test (MSLT) sleep variables in patients with IH compared with clinical controls and applied a data-driven variable reduction strategy to isolate features that explain the most variability within the IH diagnosis.

Methods: We studied 51 people ages 15–45 years with IH (meeting ICSD-3-TR criteria) and 46 clinical controls (sleepy people not meeting diagnostic criteria for IH or narcolepsy) who underwent a nocturnal PSG followed by MSLT or long sleep PSG study (allowed to sleep till natural waking) at Beth Israel Medical Center or Boston Children's Hospital. Inclusion criteria specified time in bed of ≥ 9 hours. Candidate sleep features included conventional PSG and MSLT metrics and bout-level analyses of NREM sleep stages. Group comparisons and correlations with the Idiopathic Hypersomnia Severity Scale (IHSS) across groups were used for variable selection (Cohen's $d > 0.40$, IHSS correlation $r > 0.30$

and $p < 0.05$). Variables were entered into an IH sleep principal component analysis (PCA).

Results: Three sleep features met inclusion for PCA within the IH group: nocturnal total sleep time (nTST), sleep efficiency, and mean sleep latency (MSL). The Kaiser-Meyer-Olkin measure was acceptable for 3-variable model ($KMO = 0.529$), and Bartlett's test indicated factorability ($\chi^2 = 58.9$, $p < .001$). PCA yielded one dominant component (eigenvalue = 2.01) with high factor loadings of total sleep time (0.94) and sleep efficiency (0.91) explaining 66.9% of total variance (Component 1). Component 2 explained 27.8% of the variance (eigenvalue = 0.84) predominantly contributed by mean sleep latency (0.84).

Conclusion: The majority of total explained variance in IH sleep physiology arises from nocturnal sleep duration and consolidation. Data-driven feature reduction supports two IH groups: one defined by high sleep capacity and another by daytime sleepiness. These findings support modified protocols to capture long sleep duration and inclusion of nocturnal sleep metrics—particularly TST and sleep efficiency—in diagnostic criteria for IH.

Support (if any): Jazz Pharmaceuticals ISR (Maski)

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0709

SEX DIFFERENCES IN THE MATURATIONAL TRAJECTORIES OF EXCESSIVE DAYTIME SLEEPINESS FROM CHILDHOOD TO EARLY ADULTHOOD

Kaylee Rice¹, Anthony Rahawi¹, Christina Stetter¹, Susan Calhoun², Alexandros Vgontzas¹, Edward Bixler¹, Lan Kong¹, Jidong Fang¹, Julio Fernandez-Mendoza³

¹Penn State College of Medicine, ²Penn State Health, ³Penn State University, Hershey

Introduction: Increases in excessive daytime sleepiness (EDS) in the transition to adolescence are proposed to be indicative of maturational brain changes. However, whether maturational trajectories of EDS differ between males and females lack replication in population-based studies with repeated measures across the lifespan.

Methods: We analyzed longitudinal data from 699 school-age children (ages 5 to 12) at baseline from the Penn State Child Cohort who were followed-up three times during adolescence, young adulthood and early adulthood (median follow-up time 15.4y, quartiles 13.4-17.3y) providing a longitudinal age range from 5 to 33 years old. We defined EDS in a developmentally appropriate way across time-points. We fitted age-related polynomials up to the quartic term to determine the trajectory of EDS within each sex. We estimated the age at which EDS peaked and the rate of change in EDS from age 5 to peak-EDS. We also calculated the odds of EDS at maturational age segments.

Results: Cubic maturational trajectories were selected for both males and females and showed an increase in EDS between ages 5 to 10, peaking at ages 15-17, and declining after age 18. The predicted probability of EDS at age 5 was lower in females (0.8%) than males (8.1%), yet the increase in odds of EDS by age 10 was 11-times higher in females (odds ratio [OR]=43.6) compared to males (OR=3.9) ($p=0.003$). Females reached peak-EDS (59% vs. 46% predicted probability) 10 months earlier (age 16.4 vs. 17.3) and at a higher rate (5.1% vs. 3.1% per year) than males. The predicted probability of EDS at age 25 was lower in males (18.5%) than females (31.8%) and the decrease in odds of EDS between

ages 25 to 30 was 7-times larger in males (OR=0.08) than females (OR=0.57) ($p=0.004$).

Conclusion: Our findings support sex differences in the developmental trajectories of EDS, consistent with early maturation in females but worse outcome by early adulthood. Future studies should examine the biological mechanisms, social determinants and clinical risk factors of the observed sex differences, particularly as it pertains to male EDS in childhood and female EDS in early adulthood.

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0710

EVIDENCE FOR MISSED AND MISDIAGNOSIS OF NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA AS MOOD DISORDERS IN COLLEGE STUDENTS

Alexandra Loomis¹, Jennifer Prichard¹, Snigdha Pusalavidyasagar²

¹University of St. Thomas, ²University of Minnesota Medical School

Introduction: Narcolepsy and idiopathic hypersomnia (IH) are chronic central disorders of hypersomnolence that typically emerge in adolescence but often remain undiagnosed for years. Their primary clinical feature, excessive daytime sleepiness, closely resembles symptom patterns frequently observed in mood and attention-related psychiatric conditions in young adults, increasing the likelihood of diagnostic misclassification. Within college populations, where insufficient sleep is the norm, pathological hypersomnolence may be particularly difficult to recognize. This study evaluated the prevalence, demographic patterns, psychiatric comorbidity, and functional outcomes associated with diagnosed and probable hypersomnolence disorders in a large national sample.

Methods: The analysis utilized responses from 103,619 students in the Spring 2024 ACHA-NCHA IIIB survey. Students self-reporting a diagnosis of narcolepsy or hypersomnolence ($n = 170$ after data-quality exclusions) comprised the diagnosed group. A probable hypersomnia group ($n = 1,081$) was identified using a stringent 10-point rubric incorporating sleep duration, daytime sleepiness, frequency of feeling rested, and academic impairment. All other respondents served as controls. Group differences in psychiatric diagnoses, wellbeing, substance use, and academic outcomes were assessed using chi-square tests and one-way ANOVA.

Results: Probable hypersomnolence was 6-7 times more prevalent than self-reported medical diagnoses, indicating substantial underdiagnosis. Both diagnosed and probable groups were disproportionately female, White, and queer-identified relative to the broader sample. Students with hypersomnolence exhibited markedly elevated rates of depression, anxiety, ADHD, and bipolar-spectrum diagnoses, alongside higher likelihood of receiving psychotropic medication. Indices of psychological wellbeing were significantly poorer, including higher serious psychological distress, loneliness, and suicide risk. Several forms of substance use risk were elevated. Academic outcomes were adversely impacted: both hypersomnia groups reported lower GPA and were more likely to consider withdrawing from college due to health-related challenges.

Conclusion: Findings indicate that hypersomnolence disorders in college students are substantially underdiagnosed and frequently overshadowed by psychiatric symptoms. The magnitude

of impairment across mental health, substance use, and academic functioning underscores the need for systematic screening of hypersomnolence symptoms in college health settings and greater clinical awareness of sleep-psychiatric diagnostic overlap. **Support (if any):** Supported by the University of St. Thomas Young Scholars Program.

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0711

ASSOCIATION OF POLYSOMNOGRAPHIC CHARACTERISTICS AND MEAN SLEEP LATENCY TEST ACROSS CENTRAL DISORDERS OF HYPERSOMNOLENCE

Jad El Ahdab¹, Matheus Araujo², Katherine Beshears³, Tyler Bare¹, Sikawat Thanaviratananich², James Bena², Delaney ryan², Jinu johnson¹, Nancy Foldvary-Schaefer⁴

¹Cleveland Clinic Foundation, ²Cleveland Clinic, ³Cleveland Clinic Lerner College of Medicine, ⁴Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Associations between polysomnography (PSG) variables and next-day multiple sleep latency test (MSLT) outcomes across CNS disorders of hypersomnolence (CDH) are limited to observations in narcolepsy type 1 (NT1). We analyzed PSG-MSLT associations a U.S. cohort by diagnostic subgroups (NT1, narcolepsy type 2 (NT2) and idiopathic hypersomnia (IH)).

Methods: We analyzed valid paired PSG-MSLT studies from NT1, NT2, and IH patients diagnosed by clinical criteria. Analyses used Fisher's exact tests, Kruskal-Wallis tests, ANOVA, and Spearman correlations. PSG variables were evaluated against MSLT mean sleep latency (MSL) and sleep onset REM period (SOREMP) number in the overall cohort and by subgroup.

Results: A total of 533 patients were included: mean age 33.9±13.4, 76.9% female. In NT1 (n=81), PSG-MSLT coupling was strongest. MSL showed the highest correlations with PSG sleep latency ($\rho=0.59$, $p<0.001$), REM latency (REML) ($\rho=0.34$, $p=0.002$), and latencies to N1-N3. Individuals with a PSG SOREMP had shorter MSL (1.6[1.4, 3.5] vs 4.4[2.7, 7.1] min, $p<0.001$), and more MSLT SOREMPs (5.0[5.0, 6.0] vs 2.0[2.0, 4.0], $p<0.001$). PSG REML was negatively correlated with number of MSLT SOREMPs ($\rho=-0.68$, $p<0.001$). In NT2 (n=149), observed associations persisted but were attenuated relative to NT1. MSL correlated with PSG sleep latency ($\rho=0.26$, $p=0.001$) and REML ($\rho=0.20$, $p=0.017$). Individuals with a PSG SOREMP had shorter MSL (3.3[2.2, 5.3] vs 5.1[3.7, 7.3] min, $p=0.031$) and more MSLT SOREMPs (5.0[4.0, 6.0] vs 2.0[1.0, 3.0], $p<0.001$). Negative correlation between MSLT SOREMPs and PSG REML was observed ($\rho=-0.41$, $p<0.001$). IH (n=303) displayed the weakest PSG-MSLT relationships, with patterns distinct from both NT1 and NT2. MSL correlated with PSG sleep latency ($\rho=0.25$, $p<0.001$) and sleep stage latencies N1 and N2 ($\rho=0.33$ each, $p<0.001$), but associations between PSG REML and MSL ($\rho=0.10$, $p=0.098$) and MSLT SOREMPs ($\rho=-0.19$, $p>0.05$) were weak.

Conclusion: Patients with clinical phenotypes of CDH demonstrate clear and distinct associations with next-day MSLT. NT1 shows the strongest PSG-MSLT coupling, NT2 moderate, and IH attenuated relationships. These findings underscore the potential value of PSG versus MSLT driven outcomes underscoring the absence of REM related relationships in IH that differentiate it from narcolepsy.

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0712

ASYMPTOMATIC OBJECTIVE SLEEPINESS IS ASSOCIATED WITH DEFICITS IN NEUROPSYCHOLOGICAL PERFORMANCE: A GENERAL POPULATION STUDY

Nikolaos Athanasiou¹, Slobodanka Pejovic¹, Julio Fernandez-Mendoza², Susan Calhoun³, Kristina Lenker¹, Maria Karataraki⁴, Edward Bixler¹, Alexandros Vgontzas¹

¹Penn State College of Medicine, ²Penn State University, Hershey, ³Penn State Health, ⁴University of Crete

Introduction: Prior studies showed that asymptomatic objective sleepiness is protective of hypertension risk. Small experimental studies have shown that objective sleepiness is associated with impaired vigilance performance. The aim of this study was to examine the association of asymptomatic objective sleepiness with neuropsychological performance in individuals without a complaint of excessive daytime sleepiness (EDS) in a large general random population sample.

Methods: From a random, general population sample of 1741 adults of the Penn State Cohort, we included 1428 individuals (51.3% women; aged 49.44±13.45) without cognitive impairment, assessed by Mini Mental State Examination or EDS defined as moderate-to-severe complaint of daytime sleepiness/drowsiness and/or irresistible sleep attacks. All subjects underwent 8-hour polysomnography. We created 3 mutually exclusive groups: objective sleepiness was defined as a sleep latency (SL) ≤ 7 minutes; control group 7 < SL < 30 minutes; and sleep disturbance as a SL ≥ 30 minutes. We compared the groups' performance on a comprehensive neuropsychological battery that measured processing speed, executive attention, visual memory, and verbal fluency, while controlling for age, sex, race, BMI, years of education, alcohol use, caffeine use, smoking, mental health problems, physical health problems, apnea-hypopnea index and chronic insomnia.

Results: Compared to controls, the asymptomatic objectively sleepy group showed poorer visual memory performance ($p<0.001$) characterized by more errors ($p<0.001$), distortions ($p<0.001$) and size errors ($p<0.005$). The sleep disturbed group showed worse performance in executive attention ($p<0.006$) and more visual memory omission errors ($p<0.001$). No significant differences were detected in variables such as processing speed or verbal fluency among the three groups.

Conclusion: Asymptomatic objective sleepiness is associated with deficits in short-term memory, a key component of recollection memory. In contrast, the sleep disturbed group is associated with impaired executive control of attention. Asymptomatic objective sleepiness is associated with specific neuropsychological deficits that may impact on the individuals' daily function and behavioral methods to reduce this adverse effect should be considered.

Support (if any):

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0713

DETERMINANTS OF EXCESSIVE DAYTIME SLEEPINESS AMONG MALES AND FEMALES ACROSS THE LIFESPAN

Kaylee Rice¹, Anthony Rahawi¹, Christina Stetter¹, Susan Calhoun², Alexandros Vgontzas¹, Edward Bixler¹, Lan Kong¹, Jidong Fang¹, Julio Fernandez-Mendoza³

¹Penn State College of Medicine, ²Penn State Health, ³Penn State University, Hershey

Introduction: The developmental trajectory of excessive daytime sleepiness (EDS) differs between males and females. EDS is more prevalent in males than females at ages 5-10, yet it peaks earlier in females at ages 15-17 and remains more prevalent at ages 20-30 than in males. However, the determinants of EDS at critical developmental periods within males and females are not well understood.

Methods: We analyzed data from the Penn State Child Cohort, a randomly selected population-based sample of 699 school-age children who were followed-up three times during adolescence, young adulthood and early adulthood from ages 5 to 33y (median follow-up time 15.4y, quartiles 13.4-17.3y). We defined EDS in a developmentally appropriate way at each time-point. We stratified by sex and examined demographic (e.g., race/ethnicity), clinical (e.g., body mass index [BMI], waist circumference [WC], Tanner stage), polysomnographic (e.g., obstructive sleep apnea [OSA], total sleep time [TST]), and self-reported (e.g., internalizing disorders, insomnia) risk factors of EDS.

Results: At ages 5-10, black race, ADHD, BMI, WC, and OSA were associated with EDS among males, while asthma/allergies were among females. At ages 12-14, WC, insomnia, and eveningness were associated with EDS among females, while black race was among males. At ages 15-17, BMI, WC, insomnia, and eveningness were associated with EDS among females, while Tanner stages 4-5 and Hispanic ethnicity were among males. At ages 18-20, alcohol and eveningness were associated with EDS among females, while asthma/allergies were among males. At ages 20-24, employment, internalizing disorders, and longer TST were associated with EDS among males, while eveningness was among females. At ages 25-33, ADHD, longer TST, insomnia, and eveningness were associated with EDS among females, while black race, WC and eveningness were among males; BMI and OSA were associated in both sexes.

Conclusion: Childhood EDS in males is related to black race, ADHD, obesity and OSA. In mid-adolescence, all females were pubertally mature and males at later pubertal stages reported similarly high EDS. Adult EDS is related to obesity and OSA in both sexes, while the association of eveningness and long TST starts earlier in females and in males, respectively.

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0714

HEART RATE VARIABILITY ACROSS CENTRAL DISORDERS OF HYPERSOMNOLENCE

Sikawat Thanaviratnanich¹, Matheus Araujo¹, Kulrithra Pisanuwongrak¹, Delaney ryan¹, James Bena¹, Jinu johnson², Jad El Ahdab², Katherine Beshears³, Nancy Foldvary-Schaefer⁴

¹Cleveland Clinic, ²Cleveland Clinic Foundation, ³Cleveland Clinic Lerner College of Medicine, ⁴Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Central disorders of hypersomnolence (CDH), including narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and idiopathic hypersomnia (IH), are associated with autonomic abnormalities. Animal studies show that orexin loss reduces sympathetic tone. However, clinical studies assessing autonomic function, including heart rate variability (HRV), in NT remain limited and inconsistent. Autonomic impairment is also reported

in IH, but HRV is evaluated in only one study revealing increased parasympathetic tone during wake and sleep. The objective was to compare HRV in patients with NT1, NT2, IH and controls

Methods: Adults with NT1, NT2, IH according to ICSD-3-TR who underwent PSG followed by MSLT (PSG/MSLT) at Cleveland Clinic from 2012-2024 were included. Controls were individuals who completed PSG/MSLT in the same period with no CDH, with habitual sleep time > 7hours and mean sleep latency ≥ 12 minutes on MSLT. All participants had AHI < 10, PLMI < 10, and were free of medications affecting HRV. HRV indices- standard deviation of NN intervals (SDNN) and root mean square of successive differences (RMSSD) were derived from the ECG signal during PSG.

Results: A total of 213 adults were analyzed (18 NT1, 39 NT2, 103 IH, and 53 controls), with a predominance of females in all diagnostic groups (77.8% NT1, 69.2% NT2, 78.4% IH, and 71.7% controls). Mean age differed modestly across groups (overall 33.5±12.6 years; p=0.032). No significant difference in overall, NREM sleep, REM sleep, light sleep, deep sleep SDNN and RMSSD among NT1, NT2, IH, and control was observed. Overall SDNN was 68.3ms [52.9, 78.4] in NT1, 64.4ms [50.5, 100.9] in NT2, 61.5ms [46.0, 90.5] in IH, and 68.0ms [57.3, 90.4] in control (p-value 0.39). Overall RMSSD was 74.0ms [47.3, 85.6] in NT1, 67.0ms [49.4, 126.6] in NT2, 57.8ms [42.0, 103.9] in IH, and 66.3ms [53.9, 95.9] in control (p-value 0.52).

Conclusion: SDNN and RMSSD did not differ significantly among CDH subtypes or controls across sleep stages. Although these indices tended to be consistently lower in IH, differences were not statistically significant, suggesting limited utility of conventional HRV measures in detecting autonomic dysfunction in CDH.

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0715

IMPACT OF DEPRESSION SEVERITY IN IDIOPATHIC HYPERSOMNIA AND HYPERSOMNIA ASSOCIATED WITH A PSYCHIATRIC DISORDER

Nayeli Nunez Cruz, Ruda Lee, Jennifer Goldschmied, Philip Gehrman
University of Pennsylvania

Introduction: Sleep disorders are often associated with psychiatric disorders, and hypersomnolence and depression commonly co-occur. Depression can also be a consequence of central disorders of hypersomnolence such as Idiopathic Hypersomnia (IH). Since IH and depression have overlapping symptoms, this can complicate accurate diagnosis and treatment planning. Therefore, we aimed to examine the relationship between depression-related traits and sleep metrics in both Idiopathic Hypersomnia (IH) and Hypersomnia Associated with a Psychiatric Disorder (HAPD).

Methods: As part of the study, participants completed a clinical interview and questionnaires about sleep and mood to determine eligibility and be placed into one of the two groups: IH or HAPD. Subjects wore a GENEActiv watch to measure movement and light and simultaneously completed sleep diaries. Participants completed two overnight polysomnograms (PSG), with the second night followed by a standard Multiple Sleep Latency Test (MSLT). Questionnaire and PSG measures were compared between groups using two-sample t-tests. Pearson correlations were used to examine the relationship between each measure and depression severity.

Results: Thirty participants completed questionnaires and at least one night of polysomnography. There was a total of n=12

for IH and $n=18$ for HAPD. The average age was 29.9 years, 83.3% female, and 86.2% Caucasian. There were no significant differences between groups on mood or sleep measures. There was a positive correlation between Hypersomnia Severity Index and depression severity ($r=0.375$, $p=0.041$), and a positive correlation between sleep latency and depression severity ($r=0.514$, $p=0.021$).

Conclusion: These data demonstrate the significant overlap in symptomology and thus suggest that there might be difficulty in differentiating between IH and HAPD. Depression severity across groups, rather than IH or HAPD, may be a stronger predictor of sleep and hypersomnolence measures. More in-depth depressive measures may provide further insight than self-reported depression symptoms.

Support (if any): Jazz Pharmaceuticals

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0716

IMPORTANCE OF SLEEP TESTING TO DIFFERENTIATE NEWLY AND PREVALENT DIAGNOSED IDIOPATHIC HYPERSOMNIA IN ADMINISTRATIVE CLAIMS DATA: REAL-WORLD EVIDENCE

Tianze Jiao¹, Rakesh Bhattacharjee², Yishan Chen¹, Qing Liu¹, Atul Malhotra³, Emerson Wickwire⁴, Chien-Yu Tseng¹, Christopher Kaufmann¹

¹University of Florida, ²University of California San Diego, ³UC San Diego Health, ⁴University of Maryland School of Medicine

Introduction: Administrative claims data are increasingly leveraged in sleep research. Accurate cohort identification and selection of an appropriate “index date” are essential for valid assessment of downstream health outcomes. Idiopathic hypersomnolence (IH) is a chronic sleep disorder associated with several long-term comorbidities. To estimate the impact of newly diagnosed IH on important comorbidities including cardiovascular diseases, it is essential to establish an accurate index date. We hypothesize that defining the index date using additional sleep testing rather than relying solely on diagnostic claims, will more accurately identify newly diagnosed patients, as demonstrated by their differences in baseline characteristics.

Methods: We created a cohort using MarketScan®, a large national claims database, from 2005–2022. Patients were enrolled at the index date when they were diagnosed with IH. To differentiate newly diagnosed cohort from prevalent diagnosed cohort, we additionally required a confirmative test (including multiple sleep latency test, polysomnography, or a home sleep apnea test) within 60 days prior to the index date. Then, we excluded patients who were diagnosed with narcolepsy, experienced major adverse cardiovascular events, subclinical cardiovascular disease within 1-year prior to index date or did not have 1-year continuous enrollment before the index date for both cohorts. We reported the baseline characteristics, and conducted chi-square tests of these two cohorts.

Results: We identified 5,472 and 10,866 patients who were newly and prevalent diagnosed with IH, respectively. Those newly diagnosed were statistically younger (≤ 25 years old: 26.1% vs 24.3%; 26–45 years old: 49.3% vs 49.0%; 46–65 years old: 24.6% vs 26.7%), statistically more likely to experience anxiety (19.9% vs. 18.5%),

depression (24.0% vs 22.2%), mood disorder (21.4% vs. 20.0%), obesity (9.8% vs. 8.3%), periodic limb movement disorder (3.0% vs. 2.4%), and sleep apnea (34.0% vs. 27.0%). They were statistically less likely to receive IH medication including oxybate (0.3% vs. 0.7%), stimulant (9.5% vs. 14.4%), and wake-promoting agent (10.7% vs. 21.5%).

Conclusion: A recent sleep test serves as a useful indicator for identifying patients with newly diagnosed IH patients and provides a more accurate index date for outcomes research.

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0717

INFRASLOW OSCILLATIONS DURING NREM SLEEP IN CNS DISORDERS OF HYPERSOMNOLENCE

Yu Luo¹, Kiran Maski², Brian Cade¹, Shaun Purcell¹

¹Brigham and Women's Hospital, ²Department of Neurology, Boston Children's Hospital

Introduction: Infralow oscillations (ISO, < 0.1 Hz) during NREM sleep are strongly modulated by noradrenergic locus coeruleus (LC) activity, are synchronized with NREM–REM transitions and spontaneous awakenings, and are most evident in the modulation of sigma power (10–15 Hz) in the scalp EEG. Based on animal studies, these oscillations are proposed to act as “gatekeepers” of the NREM–REM sleep cycle: high LC activity promotes cortical microarousals, whereas low LC activity permits NREM-to-REM transitions. However, the role of ISO in human sleep disorders remains poorly understood. Here we investigate ISO alterations across CNS disorders of hypersomnolence.

Methods: This multicenter study included 1,217 participants: 85 idiopathic hypersomnia (IH; 60 females), 177 narcolepsy type 1 (NT1; 86 females), 27 narcolepsy type 2 (NT2; 11 females), 551 obstructive sleep apnea (OSA; 245 females), and 377 healthy controls (229 females). We quantified group differences, sex effects, and associations with mean sleep latency (MSL) and Epworth Sleepiness Scale (ESS), adjusting for age, sex, and study, with FDR correction. We further computed standard sleep macro- and EEG micro-architecture metrics for comparative analyses.

Results: NT1 showed widespread ISO abnormalities (121 significant features at FDR 0.05), including increased N2 infralow spectral peak amplitude in fast-sigma ISO modulation and disruptions in intra-band ISO alignment. In contrast, IH and NT2 showed no significant ISO alterations relative to controls, and OSA showed only two. Altered ISO features were unrelated to ESS, but several—including ISO peak amplitudes in higher bands—were associated with MSL, suggesting links to physiological sleep propensity. Sex effects were also substantial (81/196 features), mainly in ISO peak amplitude in higher bands and intra-band alignment, with NT1 showing additional disease-by-sex interactions.

Conclusion: ISO alterations represent a distinct electrophysiological pattern characteristic of NT1 but not IH, NT2, or OSA, consistent with orexin-deficiency-related instability of arousal regulation. ISO appear independent of subjective clinical sleepiness measures (ESS) and may serve as complementary markers of NT1-specific sleep–wake dynamics. Strong sex differences underscore the importance of including sex as a biological variable.

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0718

INTERACTION BETWEEN SLEEP-WAKE PATHOLOGY AND EXCESSIVE DAYTIME SLEEPINESS IN SCHOOL-BASED COHORT: INSIGHTS FROM LONGITUDINAL SURVEY DATA SET

Anne Morse¹, Erin Van Enkevort², Alicia Johns², Kristina Blessing²¹Geisinger Medical Center, Janet Weis Children's Hospital,²Geisinger

Introduction: Excessive daytime sleepiness (EDS) in adolescents is estimated to affect 4–20% of the population and may signal underlying sleep-wake pathology or hypersomnolence disorders. School-based screening programs provide a unique opportunity to identify and address these concerns early. Previous analyses of the Wake Up and Learn pilot cohort demonstrated improvements in sleep behaviors over time using the Children's Sleep Habits Questionnaire (CSHQ). However, the interaction between CSHQ-derived pathology and Epworth Sleepiness Scale for Children and Adolescents (ESS-CHAD) scores remains

Methods: We performed an exploratory factor analysis to identify the factors within the CSHQ that indicate presence of sleep or circadian pathology on the CSHQ in those with and without identified pathologic scores. We then evaluated the relationship of these factors with the presence or absence of EDS based on responses to ESS-CHAD. Using the factors identified on the exploratory factor analysis, an evaluation of the individual and combination of factors was evaluated to determine the relationship to sleepiness.

Results: The interaction between factors that lead to pathologic sleepiness vary by individual. While CSHQ scores demonstrated significant improvement over time, ESS scores showed minimal variability, suggesting resistance to behavioral interventions and highlighting potential underlying medical etiologies. Further analysis will be presented to characterize these interactions and identify high-risk phenotypes.

Conclusion: Understanding the individual factors driving pathology on the ESS-CHAD provides greater clarity on how to identify individual pathology and anticipate future care needs. Findings from this pilot cohort will inform school-based screening strategies and support recommendations for early identification and management of hypersomnolence disorders.

Support (if any):

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0719

MUCH ADO ABOUT NOTHING? CANNABINOIDS DO NOT IMPACT MULTIPLE SLEEP LATENCY TEST VARIABLES IN SUSPECTED CENTRAL DISORDERS OF HYPERSOMNOLENCE PATIENTS

Katherine Beshears¹, Jinu Johnson², James Bena³, Shannon Morrison⁴, Matheus Araujo³, Nancy Foldvary-Schaefer⁵¹Cleveland Clinic Lerner College of Medicine, ²Cleveland Clinic Foundation, ³Cleveland Clinic, ⁴Department of Quantitative Health Sciences, Cleveland Clinic, ⁵Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Urine drug testing (UDT) during MSLT is performed to rule out the presence of confounding substances. The 2021 AASM recommendations highlight cannabinoids as particularly relevant to MSLT interpretation, citing reports of shortened sleep

latency or, after recent discontinuation, REM rebound. However, conflicting reports exist. Prevalence of cannabinoid use among patients with central disorders of hypersomnolence (CDH) is unknown.

Methods: Retrospective analysis was performed of patients with suspected CDH undergoing PSG/MSLT at Cleveland Clinic, 3/2009–2/2025, who had immunoassay UDT prior to MSLT. Included patients met ICSD-3 criteria for narcolepsy type 1/2 (NT1/2), idiopathic hypersomnia (IH) or undifferentiated hypersomnia (UH). For analyses involving MSLT parameters, the “cannabinoid positive” group (UDT+) was comprised of patients with UDT positive for cannabinoids alone.

Results: From 1,031 cases with verified ICSD-3 diagnoses, 91 (8.8%) had UDT positive for cannabinoids. Positivity did not differ between CDH subgroups (6/55 (10.9%) in NT1, 7/98 (7.1%) NT2, 21/258 (8.1%) IH, 57/620 (9.2%) UH; $p=0.84$). Overall $N = 1,019$ (54 NT1, 97 NT2, 256 IH, 612 UH) after excluding cases positive for >1 substance. UDT+ and UDT- groups did not differ in age (34.0 ± 11.9 vs 35.0 ± 14.5 ; $p=0.89$), female sex (61 (77.2%) vs 686 (73.0%); $p=0.49$), BMI ($26.6 [22.7, 31.5]$ vs $27.2 [23.3, 32.3]$; $p=0.46$), or race/ethnicity composition (58 (73.4%) Caucasian vs 734 (78.4%) Caucasian; $p=0.49$). However, UDT+ had higher Epworth Sleepiness Scale scores (15.2 ± 5.1 vs 14.0 ± 5.2 ; $p=0.025$) and lower AHI on PSG ($1.00 [0.30, 3.4]$ vs $1.8 [0.70, 5.0]$; $p=0.011$). For MSLT outcomes, UDT+ and UDT- did not differ by total SOREMPs ($0.00 [0.00, 1.00]$ UDT+ vs $0.00 [0.00, 1.00]$ UDT-; $p=0.45$) or mean sleep latency (MSL) ($10.6 [5.3, 13.5]$ UDT+ vs $10.0 [5.9, 14.6]$ UDT-; $p=0.89$). Likewise, UDT+ had similar likelihood as UDT- of reaching 2+ SOREMPs (13 (16.5%) UDT+ vs 184 (19.6%) UDT-; $p=0.63$) or $MSL \leq 8$ (30 (30.8%) UDT+ vs 373 (39.7%) UDT-; $p=0.75$).

Conclusion: These findings demonstrate that a clinically important percentage of patients with suspected CDH use cannabinoids. Additionally, our results do not support ruling MSLTs as invalid solely due to cannabinoid use. Given the similar prevalence of MSLTs with $MSL \leq 8$ and/or 2+ SOREMPs between groups, cannabinoids may not impact classification of CDH subtypes; further research is needed.

Support (if any):

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0720

SLEEP MICROARCHITECTURE DETERMINANTS OF SLEEPINESS IN CENTRAL DISORDERS OF HYPERSOMNOLENCE

Alfredo Colon-Marrero¹, Ankit Parekh¹, Korey Kam¹, Sajila Wickramaratne¹, Pavel Boulgakou², Nagharjun Mathi Mariappan¹, Masrai Williams¹, Nathan Ramey¹, Zachary Roberts¹, Andrew Varga¹¹Icahn School of Medicine at Mount Sinai, ²David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Canonical measures of sleep macroarchitecture correlate only loosely with measures of daytime sleepiness in central disorders of hypersomnolence. It is important to evaluate whether sleep microarchitecture measures such as slow wave activity around K complexes (Delta-SWAK), odds ratio product (ORP), and wake/N1 index potentially distinguish NT1, NT2, and IH and whether these values are predictive of subjective and objective measures of sleepiness.

Methods: We reviewed NPSG's performed at Mount Sinai between 2018 and 2025 from 16 patients with central hypersomnia (5 NT1,

6 NT2 and 5 IH) and 14 demographically-matched control patients with no sleep disorders per history or PSG. We used validated automated signal progressing algorithms to measure Delta-SWAK and ORP. The Wake/N1 Index (the number of transitions from any sleep stage to wake or NREM stage 1 normalized by total sleep time) was derived from the hypnogram. Delta-SWAK was available in a subset of 3 NT1, 4 NT2, and 2 IH patients.

Results: Mean N1 index was: 3.2 ± 1.4 in NT1, 2.8 ± 1.5 in NT2, 3.1 ± 2.3 in IH, and 3.7 ± 1.8 in controls. Mean wake index was 3.0 ± 1.1 in NT1, 1.8 ± 0.8 in NT2, 3.1 ± 1.7 in IH, and 2.1 ± 1.0 in controls. The N1/W index was 6.2 ± 1.8 in NT1, 4.6 ± 2.1 in NT2, 6.3 ± 2.5 in IH, and 5.8 ± 2.0 in controls. Mean Delta-SWAK was 6.2 ± 8.1 in NT1, 4.2 ± 2.0 in NT2, and 3.5 ± 1.1 in IH. No statistically significant differences between groups were observed for each sleep architecture variable (one-way ANOVA). Among the 9 subjects with hypersomnia of any cause with Delta-SWAK data, the Pearson correlation coefficient was 0.42 for Delta-SWAK and Epworth sleepiness score and was -0.05 for Delta-SWAK and mean sleep latency.

Conclusion: Prior work has suggested that daytime sleepiness was associated with a high N1/Wake index in pediatric narcolepsy and a low Delta-SWAK in OSA. Within the currently limited dataset, we are not observing significant differences in these sleep architecture variables between hypersomnia groups nor significant associations between these variables and subjective or objective measures of sleepiness.

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0721

THE TRUTH WILL SET YOU FREE: DISCLOSURE OF CANNABINOID USE BY PATIENT DEMOGRAPHICS DURING EVALUATION FOR CENTRAL DISORDERS OF HYPERSOMNOLENCE

Veda Sanghi¹, Katherine Beshears², Jinu Johnson³, Matheus Araujo⁴, James Bena⁴, Shannon Morrison⁵, Nancy Foldvary-Schaefer⁶

¹Sleep Disorders Center, Cleveland Clinic Neurological Institute, ²Cleveland Clinic Lerner College of Medicine, ³Cleveland Clinic Foundation, ⁴Cleveland Clinic, ⁵Department of Quantitative Health Sciences, Cleveland Clinic, ⁶Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: The 2021 AASM MSLT protocol recommendations do not provide a uniform requirement for urine drug testing (UDT) in patients undergoing evaluation for central disorders of hypersomnolence (CDH). Rather, UDT may be indicated “depending on clinical and community circumstances.” Selective performance of UDT may result in under-detection of recreational substances, including cannabinoids.

Methods: Retrospective analysis was performed of patients with suspected CDH undergoing PSG/MSLT at Cleveland Clinic from 3/2009 to 2/2025 who had immunoassay UDT the morning of MSLT. Included patients met ICSD-3 criteria for narcolepsy type 1/2 (NT1/2), idiopathic hypersomnia (IH) or undifferentiated hypersomnia (UH). Disclosure of cannabinoid use was determined by pre-test sleep provider office visit, during which patients were specifically asked about substance use, and from questionnaire responses about recreational drug use.

Results: Of 1,031 cases with verified ICSD-3 diagnoses (55 NT1, 98 NT2, 258 IH, 620 UH), 85 (8.24%) tested positive for cannabinoids and had documented disclosure data (63 (74.1%) Caucasian, 66 (77.6%) female, age 34.5 ± 11.8). Only 42 patients (49.4%)

disclosed cannabinoid use. Differences in age and sex between disclosure and non-disclosure groups were not significant (age 32.7 ± 9.6 vs. 36.2 ± 13.5 , $p=0.16$; female 31 (73.8%) vs. 35 (81.4%), $p=0.40$, respectively). Race/ethnicity composition was also similar between groups; disclosure group had 33 (78.6%) Caucasian, 7 (16.7%) Black, and 2 (4.8%) Multiracial patients vs. 30 (69.8%) Caucasian, 7 (16.3%) Black, and 6 (14.0%) Multiracial in non-disclosure group ($p=0.39$). Disclosure across CDH subtypes included 5/6 (83.3%) patients with NT1, 3/6 (50.0%) with NT2, 9/20 (45.0%) with IH, and 25/53 (47.2%) with UH ($p=0.48$).

Conclusion: Among patients with suspected CDH testing cannabinoid-positive on UDT the day of MSLT, nearly half did not disclose their substance use beforehand. Moreover, age, sex, race/ethnicity, and ICSD-3 diagnosis did not correlate with disclosure status. These results suggest that UDT should be universally performed during MSLT, as neither patient report nor demographic factors accurately predict cannabinoid use.

Support (if any):

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0722

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PEOPLE RECEIVING ONCE-NIGHTLY SODIUM OXYBATE TREATMENT: A SPECIALTY PHARMACY DATA ANALYSIS

Chad Ruoff¹, Michael Thorpy², Laura Herpel³, Sarah Meskill⁴, Michelle Vu⁵, Erin Buysman⁵, Diana Carino⁶, Brian Abaluck⁷, Jennifer Gudeman⁷

¹Mayo Clinic, ²Albert Einstein College of Medicine, ³Bogan Sleep Consultants, ⁴Tricoastal Narcolepsy and Sleep Disorder Center, ⁵Optum Life Sciences, ⁶Optum Frontier Therapies, ⁷Avadel Pharmaceuticals

Introduction: Once-nightly sodium oxybate (ON-SXB [LUMRYZ™]) is approved to treat excessive daytime sleepiness (EDS) or cataplexy in patients ≥ 7 years of age with narcolepsy. Real-world demographic/clinical characteristics and treatment adherence in patients with narcolepsy who received ON-SXB from a specialty pharmacy were assessed.

Methods: Baseline demographic/clinical data were collected from Optum Frontier Therapies pharmacy for patients with ≥ 1 filled ON-SXB prescription, ≥ 1 ON-SXB-related clinical assessment, and baseline Epworth Sleepiness Scale (ESS) score from 6/1/2023-9/30/2024. Adherence ($\geq 80\%$ of days covered) was assessed for patients with ≥ 3 months of ON-SXB use. Data were stratified by narcolepsy subtype (narcolepsy type 1 [NT1] and 2 [NT2] when available) and prior oxybate use (transitioned from prior oxybate therapy to ON-SXB ≤ 30 days of index [switch]/were oxybate-naïve or discontinued oxybate > 30 days before index [not-on-oxybate]). Data were analyzed descriptively.

Results: 452 patients were identified (NT1, 55%; NT2, 37%; NT unknown, 9%; switch, 40%; not-on-oxybate, 60% [oxybate-naïve, $n=147/271$]). Mean (range) age was 38.9 (16.0-88.0) years. Most patients were female (68%) and had commercial insurance (78%). Overall, 67% of patients had prior oxybate use (NT1, 72% [$n=179/247$]; NT2, 59% [$n=98/166$]; switch, 100%; not-on-oxybate, 46% [$n=124/271$]); for these patients, the most common oxybate (65%) was mixed-salt oxybates (NT1, 61%; NT2, 70%; switch, 61%; not-on-oxybate, 70%). Overall, 64% of patients used stimulants/wake-promoting agents (WPAs) (NT1, 64%; NT2, 65%; switch, 60%; not-on-oxybate, 67%). Overall, the mean (SD) baseline ESS score was 12.0 ([5.5]; NT1, 11.7 [5.5]; NT2, 12.5 [5.3];

switch, 11.0 [5.7]; not-on-oxybate, 12.7 [5.3]). At baseline, 29% of patients experienced severe EDS (ESS score ≥ 16 : NT1, 26%; NT2, 30%; switch, 20%; not-on-oxybate, 34%). Of 269 patients with ON-SXB use ≥ 3 months, 84% (NT1, 84%; NT2, 89%; switch, 94%; not-on-oxybate, 76%) demonstrated adherence.

Conclusion: Patients not on an oxybate had the highest baseline ESS scores and proportion with severe EDS, despite greater stimulant/WPA utilization. Patients with NT1 used oxybates more frequently than those with NT2 despite those with NT2 having higher baseline ESS scores and a greater proportion having severe EDS, suggesting oxybates merit earlier consideration in patients with NT2. Most patients demonstrated ON-SXB adherence, indicating they would likely receive full therapeutic benefit.

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0723

EFFECTS OF TREATMENT WITH OVEPOREXTON, AN OREXIN RECEPTOR 2 AGONIST, ON SLEEP IN PEOPLE WITH NARCOLEPSY TYPE 1: PHASE 3 RESULTS

Lucie Barateau¹, Yishu Gong², Yves Dauvilliers¹, Thomas Scammell³, Emmanuel Mignot⁴, Baiyun Yao², Yeting Du², Tathagata Banerjee², Alice Cai², Anindita Ganguly², Tina Olsson², Yelena Pyatkevich², Patrick Tierney², Brian Tracey², Dmitri Volfson²

¹Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ²Takeda Development Center Americas, Inc., ³Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital, ⁴Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: Narcolepsy type 1 (NT1) is a rare, chronic neurological disorder of central hypersomnolence with sleep/wake instability caused by significant loss of orexin neurons. Sleep disruption is characterized using both objective components, derived from nocturnal polysomnography (PSG), and subjective components including dream-like hallucinations, sleep paralysis, and disturbed nighttime sleep, captured through patient questionnaires. Orexin agonists are new therapies treating NT1 by restoring orexin signaling. Using PSG and subjective reports, we assessed the impact of oveporexton, an orexin receptor 2-selective agonist, on sleep and PSG parameters in two randomized, placebo-controlled Phase 3 studies (The First Light [FL]: NCT06470828; The Radiant Light [RL]: NCT06505031).

Methods: Participants (16–70 years) with NT1 were randomized to receive oveporexton 1mg/1mg (FL only), oveporexton 2mg/2mg, or placebo, at least 3 hours apart (first dose 8AM). PSG was collected at baseline and end of treatment. Sleep was manually scored following AASM guidelines; selected metrics were computed by quarter-night. Subjective reports were captured using the Narcolepsy Severity Scale for Clinical Trials (NSS-CT). Exploratory endpoints were analyzed with mixed-effects models. Results reported as placebo-adjusted change from baseline.

Results: PSG data were collected from 157 FL participants (placebo: n=36, 1mg/1mg: n=57, 2mg/2mg: n=64) and 101 RL participants (placebo: n=34, 2mg/2mg: n=67). In all treatment groups across both studies, oveporexton normalized rapid eye movement (REM) sleep abnormalities. Specifically, REM sleep latency increased (all $p < 0.001$), while first-quarter time spent in REM sleep decreased (all $p < 0.001$) and NT1-specific REM transitions decreased. As a fraction of total sleep time, REM sleep

decreased in oveporexton-treated groups (all $p \leq 0.005$, changes ranging from 4.0–5.1%) with corresponding increases in N2%. No significant changes occurred in N1% or N3%. Wake after sleep onset increased in the FL 1mg/1mg group ($p=0.014$) with no significant changes in other groups. Awakenings > 5 minutes, considered clinically meaningful, were unchanged. Across all oveporexton-treated groups, hallucinations and sleep paralysis (NSS-CT) were significantly reduced (all $p < 0.001$). Disturbed nighttime sleep (NSS-CT) was reduced in FL and RL 2mg/2mg groups (both $p < 0.05$).

Conclusion: Treatment with oveporexton improves REM sleep architecture and sleep-related symptoms in participants with NT1 in two Phase 3 studies.

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0724

SAFETY AND EFFICACY OF THE OREXIN 2 RECEPTOR AGONIST ALIXOREXTON IN PATIENTS WITH NARCOLEPSY TYPE 1: THE PHASE 2 VIBRANCE-1 STUDY

Giuseppe Plazzi¹, Ron Grunstein², Emmanuel Mignot³, Gert Jan Lammers⁴, David Plante⁵, Erik Buntinx⁶, Rafael Del Rio Villegas⁷, Hailu Chen⁸, Alexandra Lovett⁸, Craig Hopkinson⁸, Bhaskar Rege⁸, Julie Himes⁸, Yves Dauvilliers⁹

¹IRCCS Istituto delle Scienze Neurologiche di Bologna, ²The Woolcock Institute of Medical Research, Macquarie University, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁴Leiden University Medical Center, ⁵Department of Psychiatry, University of Wisconsin, Madison, ⁶ANIMA Research, ⁷Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁸Alkermes, Inc., ⁹Sleep-Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier

Introduction: Alixorexton is a potent, oral, selective orexin 2 receptor agonist being investigated as a treatment for narcolepsy. The phase 2 Vibrance-1 study (NCT06358950) evaluated alixorexton in patients with narcolepsy type 1 (NT1).

Methods: Adults with NT1 were randomized (1:1:1:1) to receive placebo or once-daily alixorexton (4, 6, or 8mg) in the double-blind period for 6 weeks, followed by alixorexton for 7 weeks in an optional open-label extension (OLE). The primary endpoint was change from baseline to Week (Wk) 6 in mean sleep latency (MSL) on the Maintenance of Wakefulness Test (MWT). Change from baseline to Wk6 in Epworth Sleepiness Scale (ESS) score and mean weekly cataplexy rate (WCR) at Wk6 were key secondary endpoints. Treatment-emergent adverse events (TEAEs) were collected as a secondary endpoint. P values were adjusted for multiplicity.

Results: 92 patients were randomized to placebo (n=23) or alixorexton (4mg, n=23; 6mg, n=22; 8mg, n=24); 88 completed OLE treatment. Least squares mean [LSM; 95%CI] change from baseline to Wk6 in MSL versus placebo was 22.2 (17.2, 27.2), 24.1 (19.0, 29.1), and 26.0 (21.0, 31.0) min for 4, 6, and 8mg, respectively (all $p \leq 0.01$), with all doses reaching normative levels of wakefulness. Mean ESS score improved at Wk6 (LSM change from baseline versus placebo [95%CI]: 4mg, -6.4 [-9.6, -3.3]; 6mg, -8.7 [-11.9, -5.5]; 8mg, -8.3 [-11.4, -5.2]; $p \leq 0.01$ for all doses). Clinically meaningful numerical reductions in mean WCR were observed for all doses at

Wk6 ($p=0.01$ for 6mg versus placebo). Reductions from baseline in ESS and WCR were sustained through Wk13. Most TEAEs were mild to moderate in severity and none were serious. Through Wk6, TEAEs observed in $\geq 10\%$ of patients treated with alixorexton were pollakiuria, insomnia, salivary hypersecretion, micturition urgency, and blurred vision. Most of these TEAEs that occurred in the OLE were observed in patients transitioning from placebo to alixorexton.

Conclusion: Alixorexton achieved statistically significant improvements in MWT and ESS and resulted in clinically meaningful reductions in WCR at Wk6 in patients with NT1 at all doses tested. Improvements in ESS and WCR persisted through Wk13. Alixorexton was generally well tolerated.

Support (if any): Alkermes, Inc.

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0725

IMPROVEMENTS IN SLEEP INERTIA WITH LOW-SODIUM OXYBATE TREATMENT IN PARTICIPANTS WITH NARCOLEPSY TYPE 1 AND TYPE 2 IN THE DUET STUDY

Deborah Nichols¹, Logan Schneider², David Plante³, Jing Dai¹, Teresa Steininger¹, Marisa Whalen¹, Alyssa Cairns¹, Chad Ruoff⁴, Hans Van Dongen⁵

¹Jazz Pharmaceuticals, ²Stanford University Center for Sleep Sciences and Medicine, ³Department of Psychiatry, University of Wisconsin, Madison, ⁴Mayo Clinic, ⁵Sleep and Performance Research Center, Washington State University Health Sciences Spokane

Introduction: Sleep inertia (characterized by profound difficulty waking up with grogginess, disorientation, and cognitive impairment immediately after awakening) is a core idiopathic hypersomnia symptom and may also be experienced by individuals with narcolepsy. Sleep inertia in individuals with narcolepsy is not well studied. This post-hoc analysis of the DUET study (NCT05875974) evaluated sleep inertia in narcolepsy type 1 (NT1) and narcolepsy type 2 (NT2) subgroups of the DUET narcolepsy cohort.

Methods: DUET was a phase 4, prospective, open-label study with baseline (BL), titration/optimization, stable-dose, and end-of-treatment (EOT) periods. Exploratory outcomes included Psychomotor Vigilance Test (PVT; objective performance impairment) and Karolinska Sleepiness Scale (KSS; subjective sleepiness); both administered at BL and EOT, in the morning after overnight polysomnogram. The 10-minute PVT was completed at 10, 40, and 90 minutes after awakening. The KSS, a single-item, 9-point scale, was completed upon awakening and immediately before and after the PVT assessments. Separate nonlinear, mixed-effects regression models were applied to PVT lapses and KSS ratings to estimate objective and subjective sleep inertia magnitudes, respectively, for NT1 and NT2, along with sleep inertia dissipation time constants for the overall cohort. Treatment-emergent adverse events (TEAEs) were assessed.

Results: Of 55 enrolled participants with narcolepsy, 26 and 29 had NT1 and NT2, respectively. Most (NT1/NT2) were female (73.1%/72.4%) and White (73.1%/86.2%); 16/26 and 18/29 completed the study. Based on PVT lapses, objective sleep inertia $\pm$ SE (NT1/NT2) at BL was $33.1 \pm 6.2/14.9 \pm 3.2$, and at EOT was $8.3 \pm 1.7/3.2 \pm 1.1$ (BL-to-EOT changes [95% CI]: -24.8 [-35.5 , -14.1] and -11.8 [-17.4 , -6.1]). Based on KSS ratings, subjective sleep inertia $\pm$ SE (NT1/NT2) at BL was $1.1 \pm 0.6/1.1 \pm 0.5$, and at EOT was

$0.8 \pm 0.5/1.3 \pm 0.5$ (BL-to-EOT changes [95% CI]: -0.3 [-1.9 , 1.2] and 0.2 [-1.3 , 1.6]). Sleep inertia dissipation time constants $\pm$ SE were 1.6 ± 0.3 h (PVT) and 0.4 ± 0.1 h (KSS) for the overall cohort. TEAEs were consistent with the known LXB safety profile.

Conclusion: Participants with narcolepsy, especially NT1, demonstrated objective sleep inertia at BL. Participants with NT1 or NT2 showed substantial improvements in objective sleep inertia with LXB treatment.

Support (if any): Jazz Pharmaceuticals

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0726

CLINICAL MEANINGFULNESS OF COGNITIVE IMPROVEMENTS WITH OVEPOREXTON (TAK-861) IN ADULTS WITH NARCOLEPSY TYPE 1 (NT1)

Brian Harel¹, Lucie Barateau², Yves Dauvilliers², Gert Lammers³, Tathagata Banerjee¹, Mark Etherton¹, Paul Maruff⁴, Tina Olsson¹, Robert Pietrzak⁵, Heather Romero¹, Ellie Stukalin¹, Giuseppe Plazzi⁶

¹Takeda Development Center Americas, Inc., ²Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ³Sleep Wake Centre, Stichting Epilepsie Instellingen Nederland, Heemstede, Netherlands, ⁴Cogstate, Melbourne, Victoria, Australia, ⁵Department of Psychiatry, Yale School of Medicine, ⁶IRCCS Istituto delle Scienze Neurologiche di Bologna

Introduction: Cognitive symptoms – particularly impairment in attention – are frequent in narcolepsy type 1 (NT1). In NT1, 12-week treatment with the orexin agonist oveporexton (TAK-861) significantly improved multiple cognitive domains, including attention. This study evaluated whether improvement reflected clinically meaningful change by examining relationships between change in performance on the Psychomotor Vigilance Test (PVT) and change in patient ratings of cognitive difficulties, disease severity, and function.

Methods: Blinded data from baseline and Week 12 assessments in The First Light ($n=166$) and The Radiant Light ($n=105$) phase 3 trials were analyzed using anchor- and distribution-based methods for determining meaningful within-person change (MWPC). Attention was assessed as number of lapses on the PVT (PVT lapses; 2 intraday sessions), and MWPC was identified as the smallest reliable improvement in PVT lapses associated with patient-reported change. Patient reported change was assessed using multiple anchors of cognitive difficulties, disease severity (Clinical/Patient Global Impression of Severity), and function, e.g., the Functional Impacts of Narcolepsy Instrument (FINI)–Cognitive Functioning domain, and the British Columbia Cognitive Complaints Inventory–Enhanced (BC-CCI-E) total score. Mean PVT lapse change was calculated across anchor change categories (no change/worsening, minimal improvement, much/very much improvement) to identify MWPC thresholds, which were applied to unblinded data to determine the percentage of responders in each treatment group.

Results: Patient reports of higher levels of improvement across anchor categories corresponded with progressively greater reductions in PVT lapses. Triangulated anchor- and distribution-based analyses supported selecting a reduction of ≥ 2 PVT lapses to represent an MWPC threshold that distinguishes change anchor categories from the no change/worsening category, i.e., a clinically meaningful improvement in attention. Applying the MWPC threshold to unblinded data from both studies showed 57.6%–71.9% of oveporexton-treated participants achieved clinically

meaningful improvement at Week 12, versus 17.6%-25.7% of placebo-treated participants. The odds of achieving meaningful PVT lapse change were 5-7.5 times larger at Week 12 in oreporexton-treatment groups than in placebo groups.

Conclusion: Improvement of ≥ 2 PVT-lapses represented clinical meaningful improvement in attention. Application of this threshold to unblinded data indicated 12-week oreporexton treatment provided a clinically meaningful benefit to attention for most adults with NT1.

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0727

HOLISTIC SYMPTOM BURDEN AMONG INDIVIDUALS WITH NARCOLEPSY TYPE 1 IN THE UNITED STATES

Linus Jönsson¹, Anne Morse², Tara Lavelle³, Maureen Watt⁴, Christine Ulbricht⁵, Amy Duhig⁵, Stephen Crawford⁴, Nathaniel Watson⁶

¹Karolinska Institutet, ²Geisinger Medical Center, Janet Weis Children's Hospital, ³Center for the Evaluation of Risk in Health, Tufts Medical Center, Tufts University School of Medicine, ⁴Takeda Development Center Americas, Inc., ⁵Takeda Pharmaceuticals U.S.A., Inc., ⁶University of Washington School of Medicine, Department of Neurology

Introduction: Narcolepsy type 1 (NT1) is a rare neurological disorder of central hypersomnolence, caused by the loss of orexin neurons. Symptoms include excessive daytime sleepiness (EDS), cataplexy, sleep-related symptoms (disrupted nighttime sleep [DNS], hallucinations, sleep paralysis), and cognitive symptoms, which can be disruptive and persist despite treatments. This study examined clinical and humanistic burdens, and unmet need across the spectrum of disease severity among people with NT1 in the US.

Methods: A cross-sectional online survey of people with NT1, narcolepsy type 2, or idiopathic hypersomnia was conducted in the US. Participants were recruited from clinical sites, patient panels, and patient associations. Respondents completed information about demographics, symptoms, cognitive challenges, impacts, and disease severity assessments (Epworth Sleepiness Scale [ESS], Narcolepsy Severity Scale for Clinical Trials [NSS-CT]). NT1 group findings are reported here.

Results: Overall, 247 participants (female: 74.9%) with NT1 and median (IQR) age of 40 (31-49) years were recruited. Key comorbidities included back pain (56.2%), anxiety (55.7%), and depression (53.1%). Most participants (211 [87.2%]) took narcolepsy medication in past 30 days (amphetamines (78 [37.0%]), modafinil (46 [21.8%]); 92.7% (229/247) participants reported EDS. Median (IQR) ESS total score was 16 (12-19), indicating severe EDS. Participants reported fatigue (92.9%) and taking daily naps (75.1%; median 2 naps/day); 184 (77.0%) had cognitive challenges and 63.0% (116/184) said these challenges were chronic. Overall, 207 (84.5%) experienced cataplexy (mean 5.61 episodes/week). Median (IQR) NSS-CT total score (23.5 [16-31]) indicated moderate to severe disease. According to NSS-CT, 68.9% had ≥ 1 hallucination episode/week, 67.4% were at least a little bothered by the hallucinations, and 55.3% reported having ≥ 1 sleep paralysis episode/week, with 39.5% being somewhat or very bothered by these episodes. DNS was experienced by 91.2% (217/238), with 34.5% reporting that it was very much disturbing.

Conclusion: Results highlight the substantial symptoms experienced by participants with NT1 despite current management, underscoring the unmet need for new therapeutic approaches. Novel treatments that target orexin deficiency have the potential to transform care beyond symptomatic management toward comprehensive disease control.

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0728

IMPACT OF NARCOLEPSY TYPE 1 ON QUALITY OF LIFE, EMPLOYMENT, AND SOCIOECONOMIC BURDEN: RESULTS FROM A US CROSS-SECTIONAL SURVEY

Linus Jönsson¹, Anne Morse², Tara Lavelle³, Maureen Watt⁴, Christine Ulbricht⁵, Amy Duhig⁵, Stephen Crawford⁴, Nathaniel Watson⁶

¹Karolinska Institutet, ²Geisinger Medical Center, Janet Weis Children's Hospital, ³Center for the Evaluation of Risk in Health, Tufts Medical Center, Tufts University School of Medicine, ⁴Takeda Development Center Americas, Inc., ⁵Takeda Pharmaceuticals U.S.A., Inc., ⁶University of Washington School of Medicine, Department of Neurology

Introduction: Narcolepsy type 1 (NT1) is a chronic neurological disorder of hypersomnolence, characterized by excessive daytime sleepiness (EDS), cataplexy, disrupted nighttime sleep, hallucinations, sleep paralysis, and cognitive symptoms. NT1 can negatively affect multiple aspects of life (education, work participation, family, quality of life). Large-scale burden of illness studies in NT1, related to disease severity, are lacking. This study examined the impact on various life domains across the spectrum of disease severity among people with NT1 in the US.

Methods: Cross-sectional online survey of people with NT1, narcolepsy type 2, or idiopathic hypersomnia was conducted in the US. Participants were recruited from clinical sites, patient panels, and patient associations. Questions covered demographics, symptoms, Epworth Sleepiness Scale (ESS), 5-level EQ-5D (mapped to health utilities using a US tariff), education, and employment. NT1 group findings are reported here.

Results: Overall, 247 participants (female: 74.9%) with NT1, median (IQR) age 40 (31-49) years, were recruited. Median (IQR) ESS total score, 16 (12-19), indicated severe EDS. Comorbidities included back pain (56.2%), anxiety (55.7%), depression (53.1%), and headache (44.3%). Participants (87.2%) had taken narcolepsy medication in the past 30 days. Overall, mean (SD) EQ-5D utility score was 0.61 (0.30); for lower normal daytime sleepiness (ESS 0-5): 0.64 (0.29) and for severe EDS (ESS 16-24): 0.53 (0.32). Overall, 45.3% had a university degree (37.5%, ESS 0-5; 41.9%, ESS 16-24) and 55.3% were employed (75.0%, ESS 0-5; 47.2%, ESS 16-24), of whom 81.5% reported work disruption due to NT1: 50.0% (ESS 0-5); 40.7% (ESS 16-24). Primary reasons for work disruption were fatigue (89.1%), sleepiness (87.3%), and difficulty concentrating (73.6%). In the past 3 months, 35.6% of those employed took sick leave because of their narcolepsy (25.0%, ESS 0-5; 22.8%, ESS 16-24). Of those unemployed, 45.9% received disability benefits. Overall, 57.0% required caregiver assistance.

Conclusion: Despite current management, NT1 imposes substantial burden beyond clinical outcomes, limiting work capacity and increasing reliance on informal caregivers and disability benefits.

Improved treatment efficacy has the potential to improve overall functioning and quality of life.

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0729

IMPROVEMENTS IN QUALITY OF LIFE IN PATIENTS WITH NARCOLEPSY TYPE 1 TREATED WITH THE OREXIN 2 RECEPTOR AGONIST ALIXOREXTON

Gert Jan Lammers¹, Yves Dauvilliers², Ron Grunstein³, Emmanuel Mignot⁴, David Plante⁵, Erik Buntinx⁶, Rafael Del Rio Villegas⁷, Hailu Chen⁸, Craig Hopkinson⁸, Bhaskar Rege⁸, Julie Himes⁸, Michael Doane⁸, Giuseppe Plazzi⁹

¹Leiden University Medical Center, ²Sleep-Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier, ³The Woolcock Institute of Medical Research, Macquarie University, ⁴Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁵Department of Psychiatry, University of Wisconsin-Madison, ⁶ANIMA Research, ⁷Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁸Alkermes, Inc., ⁹IRCCS Istituto delle Scienze Neurologiche di Bologna

Introduction: Narcolepsy type 1 (NT1) is characterized by excessive daytime sleepiness, cataplexy, and a host of other symptoms that may impair aspects of patients' quality of life (QoL), including relationship strain, problems completing daily activities, and physical limitations. In Vibrance-1, once-daily alixorexton (ALKS 2680), a potent, oral, selective orexin 2 receptor agonist, demonstrated clinically meaningful and statistically significant improvements from baseline in wakefulness versus placebo in patients with NT1. This presentation reports improvements in QoL with alixorexton over 6 weeks of treatment in patients with NT1.

Methods: Vibrance-1 was a placebo-controlled, dose-ranging phase 2 study with a 6-week randomized, double-blind, parallel group treatment period followed by an optional 7-week open-label extension. After 2-week washout from narcolepsy medications, adult patients with NT1 were randomized to receive placebo or alixorexton once daily at doses of 4, 6, or 8mg. Exploratory endpoints that evaluated patients' self-reported QoL included the Functional Outcomes of Sleep Questionnaire-10 (FOSQ-10), which measures 5 domains of QoL: general productivity, activity level, vigilance, social relationships, and intimate relationships. Additional exploratory endpoints that measure health-related QoL included EuroQoL-5 Dimensions-5 Levels (EQ-5D-5L) and EuroQoL Visual Analogue Scale (EQ-VAS). Statistical analyses of these endpoints were not controlled for multiplicity, so p-values are considered nominal.

Results: Ninety-two patients were randomized. In all alixorexton groups, overall FOSQ-10 scores significantly improved from baseline to Week (Wk) 6 ($p < 0.003$ versus placebo). Improvements from baseline to Wk6 were observed across all 5 FOSQ-10 subdomains in all alixorexton groups and were significant at the 6 and 8mg

dose groups ($p \leq 0.005$ versus placebo). In all alixorexton groups, improvements from baseline to Wk6 were observed for EQ-5D-5L scores ($p = 0.068$, < 0.002 , and < 0.002 for 4, 6, and 8mg versus placebo, respectively). In all alixorexton groups, mean EQ-VAS scores significantly improved from baseline to Wk6 ($p < 0.02$ versus placebo).

Conclusion: In the Vibrance-1 study, alixorexton resulted in greater improvements from baseline in QoL compared with placebo across all doses at Wk6 in patients with NT1, as measured by FOSQ-10, EQ-5D-5L, and EQ-VAS. Improvements with alixorexton were observed across various subdomains of these QoL measurements, including productivity, social relationships, and perceptions of health.

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0730

SAMELISANT (SUVN-G3031) DEMONSTRATES SIGNIFICANT REDUCTION IN EXCESSIVE DAYTIME SLEEPINESS IN PATIENTS WITH NARCOLEPSY: PHASE-2 RESULTS

Ramakrishna Nirogi, Vinod Kumar Goyal, Pradeep Jayarajan, Veera Raghava Chowdary Palacharla, Vijay Benade, Satish Jetta, Kumar bojja, Ilayaraja Kalaikadhiban
Suven Life Sciences

Introduction: Narcolepsy is a chronic neurological sleep disorder marked by excessive daytime sleepiness (EDS), sudden sleep attacks, cataplexy, hypnagogic hallucinations, and sleep paralysis. Existing therapies often present challenges, including side effects, limited efficacy, and need for complex combination regimens. Samelisant, a selective histamine-3 receptor inverse agonist, is a promising therapeutic option. In diverse animal models, Samelisant promoted wakefulness and reduced cataplexy, supporting its potential benefit in narcolepsy. Samelisant's safety/tolerability have been established in healthy volunteers. Efficacy and safety of Samelisant was evaluated in narcolepsy patients with moderate to severe EDS.

Methods: Samelisant was evaluated as monotherapy in a Phase-2, proof-of-concept study conducted in the USA and Canada to assess its efficacy in treating EDS in patients with narcolepsy (NCT04072380). The study enrolled adults aged 18–65 years who met ICSD-3 diagnostic criteria for narcolepsy, had an Epworth Sleepiness Scale (ESS) score ≥ 12 , and a mean Maintenance of Wakefulness Test (MWT) time < 12 minutes. A total of 190 patients were randomized in a 1:1:1 ratio to receive placebo, Samelisant 2 mg, or Samelisant 4 mg once daily for 14 days. The primary endpoint was the change in total ESS score from Baseline to Day 14. Secondary and exploratory endpoints included changes in Clinical Global Impression-Severity (CGI-S), MWT, and Patient Global Impression-Change (PGI-C) scores over the same period. The safety and tolerability endpoints included incidence of adverse events, vital signs, electrocardiogram, laboratory and suicidality assessments, and was assessed throughout the study by the medical monitor and an independent data safety monitoring committee.

Results: The study met its pre-specified primary efficacy end-point, with Samelisant demonstrating a statistically significant ($p < 0.024$) and clinically meaningful reduction (-2.1 points) in ESS total score compared with placebo at Day 14. Samelisant treatment also produced significant improvements in EDS across clinician- and patient-reported outcome measures. Samelisant was generally safe and well tolerated, with no serious adverse events or deaths reported in narcolepsy patients.

Conclusion: Samelisant shows promise as a monotherapy for treating EDS in patients with narcolepsy. Building on these positive results, a global Phase-3 study is planned to begin in H1 2026.

Support (if any):

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0731

COGNITIVE AND FUNCTIONAL OUTCOMES FROM THE PHASE 3 OPEN-LABEL EXTENSION AND RANDOMIZED-WITHDRAWAL ENCORE TRIAL OF AXS-12 IN NARCOLEPSY WITH CATAPLEXY

Bruce Corser¹, Michael Thorpy², Lois Krahn³, Richard Bogan⁴, Colin Shapiro⁵, Dan Chen⁶, Angad Chhabra⁶, Herriot Tabuteau⁶

¹Intrepid Research, ²Albert Einstein College of Medicine, ³Mayo Clinic, ⁴University of South Carolina School of Medicine, ⁵Sleep on the Bay, ⁶Axsome Therapeutics Inc.

Introduction: AXS-12 (reboxetine) is a highly selective norepinephrine reuptake inhibitor and cortical dopamine modulator under development for the treatment of narcolepsy. Long-term efficacy and safety of AXS-12 in participants with narcolepsy with cataplexy (NT1) were previously reported from the Phase 3 ENCORE trial. To better understand the impact of AXS-12 on overall functional burden in NT1, we evaluated changes in cognition and functional outcomes during the ENCORE trial.

Methods: ENCORE included a 24-week open-label extension (OLE) period, followed by a 3-week double-blind randomized-withdrawal (DBRW) period. During the OLE, participants received AXS-12 (5 mg once-daily for 1 week, twice-daily for 23 weeks). Following this, participants were randomized 1:1 to continue twice-daily AXS-12 for 3 weeks or switch to once-daily AXS-12 plus placebo for 1 week, then placebo twice-daily for 2 weeks. P-values reported are nominal.

Results: ENCORE enrolled 68 participants; 42 completed the OLE and entered the DBRW (AXS-12, $n=22$; placebo, $n=20$). In the OLE, participants treated with AXS-12 reported improvement in the NSAQ Ability to Concentrate item at 1 (54.8%) and 6 (58.5%) months. Participants reported improvement in concentration, assessed by PGI-C, at 1 (66.7%) and 6 (70.0%) months. Narcolepsy overall, assessed by the CGI-C, improved at 1 (90.3%) and 6 (90.2%) months; and improved at 1 (77.8%) and 6 (80.0%) months, assessed by the PGI-C. Functional impairment, assessed by the WPAI, was reduced from 53.0% at baseline to 34.0% at 1 month and 24.3% at 6 months. In the DBRW, a greater proportion of participants switched to placebo experienced worsening on the NSAQ Ability to Concentrate item (52.6% vs 14.3%; $P=0.011$), and PGI-C for ability to concentrate (57.9% vs 22.2%; $P=0.029$) at 3 weeks compared with those continuing AXS-12. A greater proportion switched to placebo also reported worsening of their narcolepsy overall (PGI-C) at 3 weeks compared with those continuing AXS-12 (52.6% vs 16.7%; $P=0.024$). Treatment with AXS-12 was generally well tolerated.

Conclusion: Long-term, open-label treatment with AXS-12 was associated with improvements in cognitive/functional domains and productivity. Randomized withdrawal to placebo led to worsening cognition and narcolepsy overall. These results further support the long-term therapeutic benefit of AXS-12 for narcolepsy.

Support (if any): Axsome Therapeutics Inc.

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0732

DRUG CLASS UTILIZATION AND AGE-RELATED TRENDS IN NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA: A CLAIMS DATABASE ANALYSIS

Rakesh Bhattacharjee¹, Michael Thorpy², Sarah Meskill³, Murad Assaad⁴, Anne Morse⁵, Jennifer Gudeman⁶, Brian Abaluck⁶

¹University of California San Diego, ²Albert Einstein College of Medicine, ³Tricoastal Narcolepsy and Sleep Disorder Center, ⁴Laureate Medical Group, ⁵Geisinger Medical Center, Janet Weis Children's Hospital, ⁶Avadel Pharmaceuticals

Introduction: Retrospective claims data were used to characterize medication usage among patients with narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and idiopathic hypersomnia (IH) to gain insight into treatment patterns among central disorders of hypersomnolence (CDH).

Methods: Patients in the US diagnosed with CDH were identified in the Komodo Health claims database. Patients in the closed data set (ie, 100% claim availability [2018-2023]) with ≥ 1 claim for a CDH (ICD-10 codes for NT1 [G47.411, G47.421], NT2 [G47.419, G47.429], and IH [G47.11, G47.12]) were included. Diagnosis was defined as ≥ 2 relevant ICD-10 codes ≥ 30 days apart. Patients with multiple, distinct NT1, NT2, or IH diagnoses were excluded. Treatment was defined as any paid prescription claim for a patient with a medication for CDH after receiving a diagnosis.

Results: Of 154,750 individuals in 2023 with ≥ 1 NT1/NT2/IH diagnosis in the Komodo database, 114,961 were excluded because claim availability was incomplete from 2018-2023, and 13,786 were excluded for having multiple, distinct NT1/NT2/IH diagnoses ($N=26,003$; NT1, 11%; NT2, 65%; IH, 24%). In this cohort, 9% of patients used oxybates (NT1, 20%; NT2, 8%; IH, 5%); 11% of patients were aged ≤ 17 years, 10% aged 18-24 years, 12% aged 25-34 years, 11% aged 35-44 years, 8% aged 45-64 years, and 3% aged ≥ 65 years. Overall, 54% of patients used wake-promoting agents (NT1, 47%; NT2, 57%; IH, 49%), 48% used stimulants (NT1, 44%; NT2, 49%; IH, 47%), and 57% used antidepressants (NT1, 59%; NT2, 56%; IH, 59%); age distribution was generally consistent for these treatments. Sedative hypnotic use (40% overall; NT1, 37%; NT2, 41%; IH, 37%) increased with age (≤ 17 years, 17%; 18-24 years, 25%; 25-34 years, 33%; 35-44 years, 38%; 45-64 years, 44%; ≥ 65 years, 46%).

Conclusion: In patients with CDH, oxybate usage was considerably lower than medications not indicated for narcolepsy (eg, antidepressants, sedative hypnotics); moreover, oxybates were half as likely to be used in NT2 than NT1, highlighting a disparity not demonstrated among treatment patterns for other medication classes. Widespread (40%) sedative hypnotic use that increased with age underscores the prevalence and need for management of progressive nighttime symptoms, including fragmented sleep, across CDH.

Support (if any): Avadel Pharmaceuticals

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0733

EFFECT OF OVEPOREXTON (TAK-861), AN ORAL OREXIN RECEPTOR 2 AGONIST, ON NARCOLEPSY TYPE 1 SYMPTOM SEVERITY: A POOLED ANALYSIS OF TWO PHASE 3 STUDIES

Yves Dauvilliers¹, Isabelle Arnulf², Lucie Barateau¹, Claudio Liguori³, Fabio Pizza⁴, Oliver Sum-Ping⁵, Mark Etherton⁶, Ellie Stukalin⁶, Philipp von Rosenstiel⁶, Tina Olsson⁶

¹Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ²National Reference Network for Narcolepsy, Paris, France, ³Neurology Unit, University Hospital of Tor Vergata, Roma, Italy, ⁴Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy, ⁵Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁶Takeda Development Center Americas, Inc.

Introduction: Narcolepsy type 1 (NT1) is a neurologic disorder of hypersomnolence caused by loss of orexin producing neurons. We report a pooled analysis of NT1 symptom severity using data from two randomized, double-blind, phase 3 studies (The First Light: NCT06470828; The Radiant Light: NCT06505031) of oveporexton (TAK-861).

Methods: Participants were aged 16–70 years with an established diagnosis of NT1 according to International Classification of Sleep Disorders, Third Edition (ICSD-3) or ICSD-3-text revision; Epworth Sleepiness Scale score ≥ 11 ; and ≥ 4 partial/complete episodes of cataplexy/week. Participants were randomized to twice daily oveporexton 1mg (The First Light only), 2mg, or placebo, ≥ 3 hours apart for 12 weeks. Secondary/exploratory endpoints: Narcolepsy Severity Scale for Clinical Trials (NSS-CT; a 15-item scale assessing sleepiness, cataplexy, sleep paralysis, hallucinations, and disrupted nocturnal sleep, score range 0–57), Patient Global Impression Scales of Severity (PGI-S) and Change (PGI-C), and Clinical Global Impression Scales of Severity (CGI-S) and Change (CGI-C).

Results: Overall, 273 participants were randomized to oveporexton 1mg/1mg (n=61), 2mg/2mg (n=136), or placebo (n=76). Mean baseline NSS-CT total scores were 30.8 (8.45) and 31.5 (9.37) for oveporexton and placebo, respectively. At baseline, 66.5% and 63.2% of oveporexton- and placebo-treated participants rated narcolepsy symptoms as severe/very severe on PGI-S and most participants were rated as markedly-to-extremely ill on the CGI-S (oveporexton, 155/196 [79.1%]; placebo, 62/76 [81.6%]). At week 12, least square mean difference vs placebo (95% CI) for change from baseline in NSS-CT was -14.8 (-17.5 , -12.0 ; 1 mg/1mg) and -17.4 (-19.6 , -15.2 ; 2mg/2mg; both nominal $P < 0.0001$). At week 12, 3.7% and 52.9% of oveporexton- and placebo-treated participants rated NT1 symptoms as severe/very severe on PGI-S, while 2.7% and 77.1% of participants, respectively, were rated as markedly, severely or extremely ill on the CGI-S. At week 12, symptoms measured using the PGI-C and CGI-C were reported as 'much or very much improved' by 87.8% and 80.6% of oveporexton-treated and 18.6% and 15.7% of placebo-treated participants, respectively.

Conclusion: This analysis confirmed significant improvements in the frequency, severity, and impact of narcolepsy symptoms over 12 weeks with oveporexton vs placebo.

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0734

EFFECT OF PITOLISANT ON SLEEP PATTERNS IN IDIOPATHIC HYPERSOMNIA: ANALYSIS OF PHASE 3 TRIAL SLEEP DIARY DATA

David Plante¹, Salvatore Insana², Riley Koch², Michelle Manuel², David Seiden², Eric Bauer², Kumar Budur², Jeffrey Dayno²

¹Department of Psychiatry, University of Wisconsin, Madison,

²Harmony Biosciences

Introduction: Idiopathic hypersomnia (IH) is a rare neurological disorder with symptoms including excessive daytime sleepiness (EDS), sleep inertia, excessive sleep duration, and daytime naps that typically are not refreshing. Pitolisant has been shown to reduce EDS; however, its impact on napping and sleep duration, quality, and continuity in patients with IH is unknown.

Methods: The present analyses focused on an eight-week open-label period (OLP) that was part of a twelve-week double-blind, placebo-controlled, randomized withdrawal phase 3 clinical trial to evaluate the safety and efficacy of pitolisant in adult patients with IH (NCT05156047). During the OLP, eligible participants were titrated with pitolisant for three weeks (8.9, 17.8, or 35.6 mg) and continued taking open-label pitolisant for five additional weeks. Patients completed the Consensus Sleep Diary for seven days at two timepoints: 1) prior to receiving pitolisant (screening), and 2) at the end of the eight-week OLP. These ad hoc analyses explored the potential effects of pitolisant and concomitant use of other wake-promoting medications on sleep patterns in patients with IH.

Results: One hundred and seventy-six patients (mean $\pm$ SD age; 40.1 $\pm$ 13.0 years; 77.8% female) completed sleep diaries at both screening and end of the OLP, and were thus included in these analyses. All nighttime sleep patterns remained stable between screening and end of the OLP, respectively (data expressed as mean $\pm$ SD): nocturnal sleep duration (482.3 $\pm$ 56.2 vs 482.9 $\pm$ 67.1 min, $P=0.91$); sleep quality (3.5 $\pm$ 0.8 vs 3.5 $\pm$ 0.9 [5-point Likert scale, higher is better], $P=0.22$); nighttime awakening frequency (1.6 $\pm$ 1.1 vs 1.6 $\pm$ 1.2 per night, $P=0.99$); and nighttime awakening duration (16.2 $\pm$ 16.2 vs 16.2 $\pm$ 17.1 min, $P=0.43$). Daytime nap frequency and nap duration decreased between screening and end of the OLP, respectively: nap frequency (0.8 $\pm$ 0.6 vs 0.5 $\pm$ 0.5 per day, $P < 0.0001$); and nap duration (65.0 $\pm$ 38.4 vs 55.7 $\pm$ 41.5 min, $P=0.02$). Concomitant use of other prescribed wake-promoting medications did not influence any sleep pattern outcomes.

Conclusion: During eight weeks of open-label pitolisant administration, patients experienced stable nocturnal sleep duration, quality, and continuity, as well as a decreased number and duration of daytime naps. These data suggest that eight-week open-label pitolisant administration did not adversely affect sleep patterns in patients with IH.

Support (if any): Harmony Biosciences

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0735

EFFECT OF THE ORAL OREXIN RECEPTOR 2 AGONIST OVEPOREXTON (TAK-861) ON FUNCTIONAL IMPACTS OF NARCOLEPSY TYPE 1: RESULTS FROM TWO PHASE 3 STUDIES

Giuseppe Plazzi¹, Yves Dauvilliers², Fabio Pizza³, Stephen Crawford⁴, Tina Olsson⁴, Yelena Pyatkevich⁴, Heather Romero⁴, Yulia Savva⁴, Baiyun Yao⁴, Mark Etherton⁴

¹IRCCS Istituto delle Scienze Neurologiche di Bologna, ²Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ³Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy, ⁴Takeda Development Center Americas, Inc.

Introduction: Narcolepsy type 1 (NT1), a central hypersomnolence disorder with deficiency of hypothalamic orexin signaling, affects functioning, quality of life, and work productivity. We evaluated the effect of oreporexton (TAK-861), an orexin receptor 2-selective agonist, on the Functional Impacts of Narcolepsy Instrument (FINI; comprised of 6 independent domains: Tiredness, Cognitive Functioning, Cataplexy, Social Activities, Everyday Activities, and Everyday Responsibilities) in two phase 3 trials in participants with NT1 (The First Light [FL]: NCT06470828 and The Radiant Light [RL]: NCT06505031).

Methods: Eligible participants were 16–70 years with a confirmed ICSD-3 NT1 diagnosis supported by polysomnography or orexin cerebrospinal fluid ≤ 110 pg/mL; participants had an Epworth Sleepiness Scale score ≥ 11 and ≥ 4 partial/complete cataplexy episodes/week. Participants received twice daily oral oreporexton 1 mg (The First Light only) or 2 mg, or placebo, ≥ 3 hours apart for 12 weeks. The FINI (secondary endpoint) is scored from 0 (best functioning) to 100 (worst functioning).

Results: Overall, 273 participants were randomized (FL, $n=168$; RL, $n=105$) to oreporexton 1mg/1mg ($n=61$), oreporexton 2mg/2mg ($n=136$), or placebo ($n=76$). Mean ages were 31.4 years (The First Light) and 30.7 years (The Radiant Light); 58.3% ($n=98$) and 47.6% ($n=50$) were female, respectively. Significant improvements versus placebo were observed for all FINI domains: Least square (LS) mean changes from baseline to Week 12 versus placebo for oreporexton were clinically meaningful across all FINI domains for both trials across all doses, all $p < 0.001$.

Conclusion: In two phase 3 trials, oreporexton consistently showed significant and clinically meaningful improvements in narcolepsy-specific functioning over placebo.

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0736

EFFECT OF THE ORAL OREXIN RECEPTOR 2 AGONIST OVEPOREXTON (TAK-861) ON QUALITY OF LIFE IN INDIVIDUALS WITH NT1: A POOLED ANALYSIS OF PHASE 3 STUDIES

Rafael Del Rio Villegas¹, Sheila Sivam², Alice Cai³, Yeting Du³, Samuel Hsiao³, Heather Romero³, Tina Olsson³, Giuseppe Plazzi⁴

¹Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ²Woolcock Institute of Medical Research and Royal Prince Alfred Hospital, ³Takeda Development Center Americas, Inc., ⁴IRCCS Istituto delle Scienze Neurologiche di Bologna

Introduction: Oreporexton (TAK-861) is an orexin receptor 2-selective agonist under investigation for the treatment of narcolepsy type 1 (NT1). We report a pooled analysis of health-related quality of life (HRQoL) measures (Short Form-36 [SF-36], Euro-Qol 5-Dimension 5-Level [EQ-5D-5L]) and treatment satisfaction (Treatment Satisfaction Questionnaire for Medication [TSQM]) data from two randomized, double-blind, phase 3 studies (The First Light: NCT06470828; The Radiant Light: NCT06505031) of oreporexton in individuals with confirmed NT1.

Methods: Eligible participants were aged 16–70 years with a confirmed ICSD-3 diagnosis of NT1 supported by polysomnography and/or MSLT and positive HLA-DQB1*06:02 allele, or orexin cerebrospinal fluid ≤ 110 pg/mL; participants had an Epworth Sleepiness Scale score ≥ 11 , and ≥ 4 cataplexy episodes/week. Participants received twice daily oral oreporexton 1 mg (The First Light only) or 2 mg, or placebo, at least 3 hours apart, for 12 weeks. SF-36 Mental (MCS) and Physical (PCS) Component Summary scores were secondary endpoints (norm-based score); EQ-5D-5L Visual Analog Scale (VAS) score (0-100 scale), EQ-5D-5L index score (0-1 scale), and TSQM (0-100 scale) were exploratory endpoints. Higher scores represented better outcomes.

Results: Overall, 273 participants were randomized to oreporexton 1mg/1mg ($n=61$), oreporexton 2mg/2mg ($n=136$), or placebo ($n=76$). At baseline, measures of HRQoL were similar between groups (mean [SD] SF-36 PCS: 48.7 [8.2], SF-36 MCS: 39.6 [9.9], EQ-5D-5L VAS: 62.8 [20.3], and EQ-5D-5L Index score: 0.78 [0.22]). TSQM was not measured at baseline. At Week 12, all scores markedly increased with oreporexton versus placebo, reaching or surpassing normative values. For oreporexton 1mg/1mg and 2mg/2mg, respectively, least square mean changes from baseline vs placebo were 5.5 and 5.7 for SF-36 PCS ($p < 0.0001$), 7.3 and 10.1 for SF-36 MCS ($p < 0.0001$), 14.6 and 17.3 for EQ-5D VAS (nominal $p < 0.0001$), and 0.19 and 0.19 for EQ-5D Index score (nominal $p < 0.0001$). Mean (SD) TSQM Global Satisfaction domain scores at Week 12 were higher for oreporexton (81.7 [20.1]) vs placebo (38.3 [30.1]).

Conclusion: In this pooled analysis of two phase 3 clinical trials, oreporexton showed clinically relevant improvements in HRQoL and nominally greater treatment satisfaction compared with placebo in participants with NT1.

Support (if any): Funded by Takeda Development Center Americas, Inc.

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0737

EFFICACY AND SAFETY OF OVEPOREXTON (TAK-861), AN ORAL OREXIN RECEPTOR 2 AGONIST, FOR NARCOLEPSY TYPE 1 TREATMENT: A POOLED ANALYSIS OF PHASE 3 STUDIES

Emmanuel Mignot¹, Yves Dauvilliers², Rafael Del Rio Villegas³, Ramin Khatami⁴, Gert Lammers⁵, Alice Cai⁶, Yeting Du⁶, Mark Etherton⁶, Samuel Hsiao⁶, Harisha Kadali⁶, Rachel Neuwirth⁶, Tina Olsson⁶, Christian Von Hehn⁶, Baiyun Yao⁶, Giuseppe Plazzi⁷

¹Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ²Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ³Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁴Center of Sleep Medicine and Sleep Research, Klinik Barmelweid, Barmelweid, Switzerland, ⁵Sleep Wake Centre, Stichting Epilepsie Instellingen Nederland, Heemstede, Netherlands, ⁶Takeda Development Center Americas, Inc., ⁷IRCCS Istituto delle Scienze Neurologiche di Bologna

Introduction: Narcolepsy type 1 (NT1) is caused by a loss of orexin producing neurons in the hypothalamus. We report a pooled analysis of two randomized, double-blind, phase 3 studies (The First Light: NCT06470828; The Radiant Light: NCT06505031) that evaluated efficacy and safety of oreporexton (TAK-861), an oral orexin receptor 2-selective agonist.

Methods: Participants were 16–70 years with an International Classification of Sleep Disorders, Third Edition (ICSD-3) or ICSD-3-text revision diagnosis of NT1 supported by sleep tests or orexin cerebrospinal fluid concentrations ≤ 110 pg/mL; Epworth Sleepiness Scale (ESS) score ≥ 11 ; ≥ 4 partial/complete episodes of cataplexy/week. Participants were randomized to oreporexton 1mg (The First Light only), 2mg, or placebo, twice daily (3 hours apart) for 12 weeks, then either entered a long-term extension study or 4 weeks of follow-up. Primary endpoint: change from baseline in mean sleep latency on the Maintenance of Wakefulness Test (MWT) at week 12. Secondary endpoints: change from baseline in ESS score at week 12, weekly cataplexy rate (WCR) at week 12, and treatment-emergent adverse events (TEAE).

Results: Overall, 273 participants (54.2% female) were randomized to oreporexton 1mg/1mg ($n=61$), 2mg/2mg ($n=136$), or placebo ($n=76$). Mean baseline age was 31.1 years, ESS score was 18.1, MWT mean sleep latency was 4.8 minutes and median baseline WCR was 26.0 attacks. At week 12, the least square mean differences from placebo (95% CI) for change from baseline in MWT mean sleep latency were 15.90 (12.65, 19.15) minutes (1mg/1mg oreporexton) and 19.16 (16.65, 21.68) minutes (2mg/2mg; both nominal $P < 0.001$), and in ESS total score -8.27 (-9.82 , -6.73 ; 1mg/1mg) and -9.71 (-10.92 , -8.50 ; 2mg/2mg; both nominal $P < 0.001$). Oreporexton decreased WCR at week 12 (incidence rate ratio [95% CI] vs placebo: 1mg/1mg, 0.28 [0.19, 0.41], 2mg/2mg, 0.32 [0.23, 0.45]; both nominal $P < 0.001$). The most common TEAEs with oreporexton were pollakiuria and insomnia; 6 participants (1mg/1mg oreporexton $n=3$; 2mg/2mg $n=2$; placebo $n=1$) had TEAEs leading to study drug discontinuation. 258 participants completed study treatment and 250 continued into the long-term extension.

Conclusion: In this pooled analysis, oreporexton treatment improved measures of wakefulness, sleepiness, and cataplexy frequency and was generally well tolerated.

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0738

OVEPOREXTON (TAK-861) IMPROVES COGNITIVE SYMPTOMS IN PATIENTS WITH NARCOLEPSY TYPE 1: RESULTS FROM TWO RANDOMIZED, PLACEBO-CONTROLLED PHASE 3 TRIALS

Fabio Pizza¹, Yves Dauvilliers², Rafael Del Rio Villegas³, Emmanuel Mignot⁴, Thomas Scammell⁵, Tathagata Banerjee⁶, Alice Cai⁶, Mark Etherton⁶, Ellie Stukalin⁶, Vahe Khachadourian⁶, Paul Maruff⁷, Tina Olsson⁶, Robert Pietrzak⁸, Dmitri Volfson⁶, Brian Harel⁶

¹Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy, ²Sleep-Wake Disorders Center, Department of Neurology, Gui-de-Chauliac Hospital, CHU, Montpellier, France, ³Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁴Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁵Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital, Boston, MA, USA, ⁶Takeda Development Center Americas, Inc., ⁷Cogstate, Melbourne, Victoria, Australia, ⁸Department of Psychiatry, Yale School of Medicine

Introduction: Cognitive symptoms are frequent and disruptive in narcolepsy type 1 (NT1). The effect of oreporexton, an investigational selective orexin-receptor 2-agonist, on cognitive

symptoms was investigated in two phase 3 studies (The First Light: NCT06470828; The Radiant Light: NCT06505031).

Methods: Participants (16–70 years) with a diagnosis of NT1 were randomized to oreporexton 1mg/1mg (The First Light only), oreporexton 2mg/2mg, or placebo, for 12 weeks. Cognitive impairments were assessed with neuropsychological tests of attention (Psychomotor Vigilance Test [PVT] from 2 intraday sessions), memory (Continuous Paired Associate Learning, CPAL) and executive function (International-Digit Symbol Substitution Test, IDSST-S; One-Back Test, ONB). Patient-reported cognitive difficulties were assessed with the Functional Impacts of Narcolepsy Instrument Cognitive Function domain (FINI-CF) and British Columbia Cognitive Complaints Inventory (BC-CCI). For both trials, PVT and FINI-CF (reported here) were alpha-controlled secondary endpoints. Change from baseline versus placebo were evaluated using linear mixed effects or constrained longitudinal data analysis.

Results: Compared with placebo, 12-weeks of treatment with oreporexton (1mg/1mg or 2mg/2mg) produced improvements across all objective (PVT, CPAL, iDSST-s, ONB) and subjective (FINI-CF; BC-CCI) cognitive assessments (all $p \leq 0.001$). At week 12, differences from placebo (estimated mean) in PVT lapses change from baseline were -9.68 (1mg/1mg) and -10.51 (2mg/2mg; The First Light) and -8.82 (2mg/2mg; The Radiant Light). Differences from placebo (estimated mean) in FINI-CF change from baseline at week 12 were -30.7 (1mg/1mg) and -37.92 (2mg/2mg; The First Light) and -30.17 (2mg/2mg; The Radiant Light).

Conclusion: In two Phase 3 trials, oreporexton improved cognitive symptoms associated with NT1.

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0739

PHASE 3, RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDIES OF PITOLISANT DELAYED-RELEASE HD TABLETS FOR NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA

Bruce Corser¹, Yves Dauvilliers², David Plante³, Salvatore Insana⁴, David Seiden⁴, Michelle Manuel⁴, Maju Matthews⁴, Kumar Budur⁴

¹Intrepid Research, ²Sleep-Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier,

³University of Wisconsin, Madison, ⁴Harmony Biosciences

Introduction: Pitolisant is a histamine 3 receptor antagonist/inverse agonist approved for treatment of excessive daytime sleepiness (EDS) or cataplexy in adult patients with narcolepsy and for EDS in pediatric patients aged ≥ 6 years with narcolepsy. HBS-301, an optimized pitolisant formulation, with a gastro-resistant coating, at a higher dose (up to 60 mg), has been developed to potentially provide an improved treatment option for patients with narcolepsy or idiopathic hypersomnia (IH).

Methods: HBS-301-CL-301 and HBS-301-CL-302 are two global phase 3, randomized, double-blind, parallel-group, placebo-controlled studies to examine the efficacy and safety of HBS-301 in patients with narcolepsy and IH, respectively. These studies will consist of a screening/baseline period, an 8-week double-blind treatment period (2-week titration [week 1, 30 mg; week 2, 60 mg], 3-week flexible-dose, and 3-week stable-dose periods), an optional

open-label extension period (1 year), and 30 days of safety follow-up.

Results: In HBS-301-CL-301, ~258 adult participants with narcolepsy (type 1 or 2) will be randomized to receive HBS-301 or placebo (1:1); ~50% of participants will have an average weekly rate of cataplexy ≥ 3 over 2 consecutive weeks during screening. The primary endpoint will be the change from baseline to Week 8 in EDS as measured by the Epworth Sleepiness Scale (ESS). Key secondary endpoints include MWT sleep onset latency, efficacy in treating cataplexy and fatigue, as well as the onset of efficacy in treating EDS and cataplexy. In HBS-301-CL-302, ~248 adult participants with IH will be randomized to receive HBS-301 or placebo (1:1). The primary endpoint will be the change from baseline to Week 8 in EDS as measured by the ESS. Secondary endpoints include severity of IH symptoms as measured by the IHSS, sleep inertia, and fatigue, as well as the onset of efficacy and IH symptoms. In both studies, safety and pharmacokinetic concentrations of pitolisant will be examined.

Conclusion: These studies will determine the efficacy and safety of HBS-301, an optimized pitolisant formulation, with a gastro-resistant coating, at a higher dose (up to 60 mg), in patient populations with narcolepsy or IH.

Support (if any): Harmony Biosciences

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0740

SOLRIAMFETOL FOR EXCESSIVE DAYTIME SLEEPINESS IN NARCOLEPSY AND OSA: POST-HOC MULTI-DIMENSIONAL COMPOSITE ENDPOINT ANALYSIS OF PHASE 3 TRIALS

Ellen Wermter¹, Sam Kashani², Graham Eglit³, Samantha Floam³, Robert Thomas⁴

¹Restorative Sleep Medicine, ²David Geffen School of Medicine, UCLA, ³Axsome Therapeutics, Inc., ⁴Beth Israel Deaconess Medical Center

Introduction: Solriamfetol (Sunosi®) is a dopamine-norepinephrine reuptake inhibitor with agonist activity at the TAAR1 and serotonin 1A receptors approved for the treatment of EDS in narcolepsy (75-150 mg/day) or OSA (37.5-150 mg/day) in adults. To provide a more comprehensive understanding of treatment effect across objective and subjective outcomes, we evaluated clinically meaningful change in a composite assessment of primary and secondary endpoints from the Phase 3 TONES 2 (narcolepsy) and TONES 3 (OSA) trials.

Methods: TONES 2 and TONES 3 were double-blind, randomized, placebo-controlled, 12-week trials evaluating the safety/efficacy of solriamfetol for the treatment of EDS in narcolepsy or OSA, respectively. In both, co-primary efficacy endpoints were the change from baseline to week 12 in the MWT and ESS. The key secondary endpoint in both trials was the percentage of participants reporting improvement on the PGI-C at week 12. Clinically meaningful change was defined as ≥ 2 points reduction for ESS, ≥ 2 minutes increase for MWT, and minimal/much/very much improved for PGI-C.

Results: A total of 231 (TONES 2) and 459 (TONES 3) participants were included in the modified intent-to-treat populations. In

TONES 2, the percentage of participants with composite clinically meaningful change in the co-primary and key secondary endpoints was 33.3% (absolute risk difference [95% CI]: 19.9% [3.6%, 36.1%]; $P=0.018$) in the solriamfetol 75 mg and 42.0% (absolute risk difference [95% CI]: 28.5% [12.0%, 45.1%]; $P=0.001$) in the solriamfetol 150 mg groups, compared with 13.5% in the placebo group. In the TONES 3 trial, the percentage of participants with composite clinically meaningful change in the co-primary and key secondary endpoints was 24.5% (absolute risk difference [95% CI]: 4.3% [-10.1%, 18.7%]; $P=0.551$) in the solriamfetol 37.5 mg, 40.7% (absolute risk difference [95% CI]: 20.5% [5.2%, 35.9%]; $P=0.007$) in the solriamfetol 75 mg, and 70.8% (absolute risk difference [95% CI]: 50.6% [38.8%, 62.3%]; $P<0.001$) in the solriamfetol 150 mg groups, compared with 20.2% in the placebo group.

Conclusion: Treatment with 75 mg or 150 mg solriamfetol produced concurrent clinically meaningful, multi-dimensional change on objective and subjective measures of wakefulness, illustrating a comprehensive efficacy profile in patients with narcolepsy and OSA.

Support (if any): Axsome Therapeutics Inc.

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0741

TREATMENT WITH PITOLISANT IN SUBGROUPS OF ADULTS WITH NARCOLEPSY: POOLED ANALYSIS OF TWO RANDOMIZED CLINICAL TRIALS

Bernard Hark, Juhi Bhandari, Donna Zarycranski, Melissa Toler, Markiyan Doliba, David Albers
Harmony Biosciences

Introduction: Narcolepsy is a chronic, debilitating neurological disorder of sleep-wake state instability characterized primarily by excessive daytime sleepiness (EDS) and cataplexy. Pitolisant is approved by the US Food and Drug Administration for the treatment of EDS or cataplexy in adult patients with narcolepsy and the treatment of EDS in pediatric patients 6 years of age and older with narcolepsy. The aim of this analysis was to evaluate the effect of pitolisant on EDS in subgroups of adult patients with narcolepsy.

Methods: Data were pooled from 2 randomized, placebo-controlled, 7- or 8-week studies (HARMONY-1: NCT01067222; HARMONY-CTP: NCT01800045) of pitolisant in adult patients (aged ≥ 18 years) with narcolepsy. Patients in both studies were required to have EDS at study baseline as measured by the Epworth Sleepiness Scale (ESS) score; in HARMONY-CTP, patients were required to have ≥ 3 cataplexy attacks/week. Pitolisant was individually titrated over a 3-week period to a maximum dose of 35.6 mg/day; the dose remained stable thereafter. The change in ESS score from baseline to end of treatment was evaluated in different subgroups, which included age (< 30 , ≥ 30 y) and sex (male, female), as well as the following baseline characteristics: body mass index (< 25 , 25 to < 30 , ≥ 30 kg/m²), cataplexy severity (none, mild-moderate, severe), use of cataplexy medications (yes/no), renal impairment (none, mild, moderate), and hepatic impairment (none, mild).

Results: Data from 166 patients (pitolisant, n=85; placebo, n=81) were analyzed. Mean (SD) baseline ESS score was 17.6 (3.0) in the pitolisant group and 17.9 (3.1) in the placebo group. Patients who received pitolisant experienced a greater reduction (improvement) in ESS score than those who received placebo (mean difference [95% CI], -3.44 [-4.83, -2.05]; $P < 0.001$). The effect of pitolisant on ESS score was similar in most of the subgroups tested (test of interaction, $P > 0.05$), except for hepatic impairment ($P = 0.04$; pitolisant effect greater in patients with mild hepatic impairment). Headache was the most common adverse event in patients treated with pitolisant.

Conclusion: Pitolisant provides consistent improvements in EDS in a wide range of adult patients with narcolepsy.

Support (if any): Harmony Biosciences

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0742

TREATMENT WITH AN OREXIN AGONIST REDUCES MICROSLEEPS AND IMPROVES WAKEFULNESS DURING MWT IN PEOPLE WITH NT1: PHASE 3 RESULTS

Yishu Gong¹, Kiran Maski², Emmanuel Mignot³, Oliver Sum-Ping³, Mads Olsen¹, Tina Olsson¹, Patrick Tierney¹, Brian Tracey¹, Dmitri Volfson¹

¹Takeda Development Center Americas, Inc., ²Department of Neurology, Boston Children's Hospital, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: The Maintenance of Wakefulness Test (MWT) is widely used in clinical trials to assess excessive daytime sleepiness (EDS). Mean sleep onset latency (SOL), assessed by MWT, the primary endpoint in these studies, measures the ability to stay awake; it does not provide insight into the quality of wakefulness. We identified microsleeps, short (3-15 sec) periods of sleep prior to sleep onset during MWT, and artificial intelligence (AI)-derived sleepiness scores from electroencephalography (EEG) recordings as biomarkers for EDS in participants with narcolepsy type 1 (NT1), then compared these pre-post treatment with oreporexton, an oral orexin receptor 2-selective agonist. We report results from two randomized, double-blind, phase 3 studies (The First Light [FL]: NCT06470828; The Radiant Light [RL]: NCT06505031).

Methods: Participants (16-70 years) with NT1 were randomized to oreporexton 1mg/1mg (FL only), oreporexton 2mg/2mg, or placebo, at least 3 hours apart (first dose 8AM) for 12 weeks. MWT sessions consisted of 40-minute wake trials at 10AM, 12PM, 2PM, and 4PM to assess sleepiness fluctuations. Exploratory microsleeps data were scored manually during MWTs conducted at baseline and end of treatment. EEG recordings were processed to generate AI-derived sleep-stage probabilities, with all non-wake stage probabilities summed into sleepiness scores. Zero-inflated negative binomial mixed-effects models (with an offset SOL term), mixed-effects survival analysis, and linear mixed-effect model were used to analyze microsleep rates, time-to-first microsleep, and AI-derived sleepiness scores, respectively. Placebo-corrected change from baseline within treatments were computed.

Results: MWT data were collected from 158 FL participants (placebo: n=37, 1mg/1mg: n=57, 2mg/2mg: n=64) and 105 RL participants (placebo: n=35, 2mg/2mg: n=70). In all oreporexton-treated groups across both studies, microsleep rates decreased significantly relative to baseline (from 3 microsleeps per 10 min at baseline to < 1 per 10 min; each $p < 0.05$). Additionally,

oreporexton-treated groups experienced prolonged time-to-first microsleep versus placebo (each $p < 0.005$). Average microsleep duration (excluding participants with no microsleep) showed no significant change in any group from baseline.

Conclusion: Oreporexton significantly reduced microsleep rates and delayed onset of the first microsleep in MWTs, demonstrating its potential as a digital biomarker and benefit over SOL in participants with NT1.

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0743

VIBRANCE-2: A RANDOMIZED PHASE 2 STUDY EVALUATING EFFICACY AND SAFETY OF THE OREXIN 2 RECEPTOR AGONIST ALIXOREXTON IN PATIENTS WITH NARCOLEPSY TYPE 2

Richard Bogan¹, Giuseppe Plazzi², Emmanuel Mignot³, Rafael Del Rio Villegas⁴, Bruce Corser⁵, Brendon Yee⁶, Diego Garcia-Borreguero⁷, Chad Ruoff⁸, David Plante⁹, Hailu Chen¹⁰, Alexandra Lovett¹⁰, Craig Hopkinson¹⁰, Bhaskar Rege¹⁰, Julie Himes¹⁰

¹University of South Carolina School of Medicine, ²IRCCS Istituto delle Scienze Neurologiche di Bologna, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁴Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁵Intrepid Research, ⁶The Woolcock Institute of Medical Research, Macquarie University, ⁷Sleep Research Institute, ⁸Mayo Clinic, ⁹Department of Psychiatry, University of Wisconsin, Madison, ¹⁰Alkermes, Inc.

Introduction: Narcolepsy type 2 (NT2) is characterized by excessive daytime sleepiness, heterogeneous symptom severity, and typically normal endogenous orexin levels. The Vibrance-2 phase 2 study evaluated alixorexton, a selective orexin 2 receptor agonist, in patients with NT2.

Methods: Vibrance-2 was a placebo-controlled, dose-ranging phase 2 study. After a 2-week washout from current narcolepsy medications, adults with NT2 meeting ICSD-3-TR diagnostic criteria were randomized 1:1:1:1 to receive placebo or alixorexton once daily at doses of 10, 14, or 18mg for 8 weeks, followed by an optional 5-week open-label extension. Dual primary endpoints were the change from baseline to week 8 in mean sleep latency (MSL) on the Maintenance of Wakefulness Test (MWT) and on the Epworth Sleepiness Scale (ESS). Safety evaluation included treatment-emergent adverse events (TEAEs). P-values were adjusted for multiplicity.

Results: Ninety-three patients were randomized to placebo (n=24) or alixorexton (10mg, n=23; 14mg, n=22; 18mg, n=24); 90 completed double-blind treatment. At baseline, patients had severe symptoms (MWT: 5.6 minutes; ESS: 17.4). The study met its dual primary endpoints. At week 8, MSL on MWT increased 9.3, 6.7, and 6.7 minutes at 10, 14, and 18mg, respectively, from baseline versus placebo, with statistically significant differences observed for the 14 and 18mg doses (adjusted $p < 0.05$). ESS improved by -2.1, -3.2, and -3.6 points from baseline versus placebo at week 8 for the 10, 14, and 18mg groups, respectively, with statistical significance observed for the 18mg dose (adjusted $p < 0.05$), where more than 70% of patients achieved normalization. TEAEs in 10% of all alixorexton-treated patients through week 8 were polakiuria, insomnia, micturition urgency, dizziness, and headache. Most TEAEs were mild-to-moderate with no serious TEAEs.

Conclusion: Vibrance-2 was the first large clinical trial in patients with NT2 to demonstrate positive results with an orexin 2 receptor agonist. Alloxorexton resulted in statistically significant and clinically meaningful improvements in wakefulness and daytime sleepiness at Week 8 and was generally well tolerated. These results support phase 3 clinical development of alloxorexton as a treatment for NT2.

Support (if any): Alkermes, Inc.

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0744

A SYSTEMATIC REVIEW OF NON-PHARMACOLOGICAL INTERVENTIONS FOR CENTRAL DISORDERS OF HYPERSOMNOLENCE: HIGHLIGHTING LIVED EXPERIENCE INVOLVEMENT

Elena Bild¹, Shannon Edmed¹, Aaron Schokman², Simon Smith¹, Sara Winter³

¹University of Queensland, ²University of Sydney, ³Queensland Health

Introduction: People with central disorders of hypersomnolence (CDH), which include Narcolepsy Types 1 & 2, and Idiopathic Hypersomnia (IH), have high rates of mental health disorder symptoms and lower health-related quality of life (HRQoL), despite treatment with medications. Recent efforts have aimed to develop adjunctive non-pharmacological interventions. Lived experience involvement is now expected in research to enhance acceptability and relevance, but the application of lived experience involvement in CDH is unclear. This systematic review aims to evaluate the feasibility, acceptability, and effectiveness of non-pharmacological interventions for CDH on sleep and psychological outcomes and examine how people with CDH are involved across the research cycle.

Methods: This review was preregistered on OSF and followed PRISMA guidelines. A search was conducted on Medline, CINHAL, PsycINFO, Embase, CENTRAL, Web of Science, and ClinicalTrials.gov in July 2025. Studies reporting non-pharmacological intervention effects on mental health, HRQoL, functional, or sleep-related symptoms in confirmed CDH were included.

Results: From 7804 studies, 12 studies were included. Studies focused on napping and/or sleep schedules (n=7), cognitive behavioural therapy (CBT; n=3), mindfulness-based (MBI; n=1), and meditation-relaxation therapy (MR therapy; n=1) interventions. Extended nocturnal sleep interventions for narcolepsy generally reported improvements in daytime sleepiness. Napping intervention results for narcolepsy were inconsistent. Psychology interventions (CBT, MBI, and MR therapy) found generally positive results on their primary outcomes; CBT and MBI interventions significantly improved some mental health outcomes; CBT for Nightmares significantly improved nightmare severity; and MR therapy significantly improved sleep paralysis. All studies were pilot or feasibility studies with small sample sizes and good acceptability. One psychology intervention and no napping or sleep schedule interventions were tested with people with IH. People with narcolepsy were involved in three studies, but reporting was limited and did not use recommended reporting procedures. No people with IH were involved in the design of any interventions.

Conclusion: There has been recent progress in developing adjunctive non-pharmacological interventions for people with CDH that show promising effectiveness. However, involvement of people

with CDH using standardised reporting, especially with people with IH, is absent and should be incorporated into future research.

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0745

A REAL-WORLD ASSESSMENT OF RETENTION OF ONCE-NIGHTLY OXYBATE AMONG PATIENTS: A SINGLE-CENTER RETROSPECTIVE ANALYSIS

James Colwell, Gerard Meskill, Sarah Meskill

Tricoastal Narcolepsy and Sleep Disorder Center, PLLC

Introduction: Narcolepsy type 1 (NT1) and type 2 (NT2) are chronic neurological disorders characterized by excessive daytime sleepiness, disrupted nocturnal sleep, and symptoms of dissociated REM. Sodium oxybate has been a mainstay of treatment, beginning with FDA approval of twice-nightly oxybate (TN-OXB) in 2002. Once-nightly oxybate (ON-OXB) received FDA approval in 2023 to eliminate middle-of-the-night dosing. We sought to evaluate patient adherence and tolerance with ON-OXB in the clinical setting.

Methods: A manual chart review was performed for patients seen at a sleep center in Sugar Land, TX from 6/1/2023 to 12/7/2025. Eligible patients carried a diagnosis of NT1/NT2 and had been prescribed ON-OXB. EMR reporting tools were used to identify charts with a ON-OXB prescription, followed by manual confirmation of inclusion criteria and gathering of demographic information. Patients who had not returned for follow-up after receiving an ON-OXB prescription were excluded.

Results: Seventy-six patients were initiated on ON-OXB: 31 NT1 (41%), 45 NT2 (59%); 58 female, 18 male. Of these, 37 (49%) were oxybate naive, and 39 (51%) transitioned from TN-OXB. Twenty seven (35.5%) patients stopped ON-OXB. Of the oxybate naive, 26 (70%) remained on therapy. Of those who switched from TN-OXB, 23 (59%) remained on ON-OXB. A higher percentage of NT1 patients remained on ON-OXB than NT2 patients (74% vs. 58%, respectively). Women found more success with ON-OXB than men (67% vs. 56%, respectively). Of the 27 who stopped, 15 (55.5%) went to TN-OXB (6 oxybate naive, 9 switched back). Twelve (15.8%) patients outright discontinued oxybate.

Conclusion: In this real-world clinical setting, continuation of ON-OXB therapy was lower than reported in clinical trials. Differences could be seen in narcolepsy type, prior oxybate exposure, and gender. While most patients did remain on ON-OXB (64.5%), 19.7% went to TN-OXB, and 15.8% discontinued oxybate. These trends show that while an increase in treatment alternatives is beneficial, additional options are needed. This study is limited by small sample size. Larger studies are needed to confirm these trends.

Support (if any): N/A

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0746

ACUTE EFFECTS ON SLEEP PARAMETERS FOLLOWING SINGLE DOSES OF E2086 IN PATIENTS WITH NARCOLEPSY TYPE 1

Gary Zammit¹, Jocelyn Cheng², Nancy Hall², Margaret Moline²

¹Clinilabs, ²Eisai Inc.

Introduction: Sleep architecture is abnormal in narcolepsy, a disorder associated with daytime sleepiness, nocturnal sleep disruption, and profound impacts on REM sleep. We evaluated the effects of an orexin-receptor agonist (new class of potential narcolepsy treatments) on sleep architecture.

Methods: E2086-A001-101, a multicenter, randomized, double-blind, double-dummy, single-dose, 5-period crossover study, evaluated 3 doses of E2086 (5mg, 10mg, 25mg) compared with placebo (PBO) and modafinil 200mg (not reported here) in adults with verified narcolepsy type 1. Participants received study drug within an hour of waketime and underwent a nocturnal polysomnogram (approximately 12 hours post-dose). Sleep stages were scored according to standard criteria. To compare the doses of E2086 with PBO, a mixed-model analysis was performed with sleep stage parameter as the dependent variable, treatment, period, and sequence treated as fixed effects, and participant treated as a random effect. Two-sided 95% CIs were calculated for the differences of the least squares means of the doses versus PBO.

Results: Of 22 participants randomized, 19 were completers (ie, received all 5 treatments and had efficacy data). Latency to persistent sleep was significantly longer with 10mg ($P=0.0332$) and 25mg ($P=0.0001$) versus PBO. Wake after sleep onset was significantly higher with 25mg ($P=0.0005$) versus PBO, and sleep efficiency was lower with 10mg ($P=0.0031$) and 25mg ($P<0.0001$) versus PBO. Total sleep time was significantly shorter with 10mg ($P=0.0044$) and 25mg ($P<0.0001$) versus PBO. All doses were associated with significantly longer REM latency versus PBO (5mg $P=0.0477$; 10mg $P<0.0001$; 25mg $P<0.0001$) and decreased duration of REM sleep versus PBO (5mg $P=0.0002$; 10mg $P<0.0001$; 25mg $P<0.0001$). Total non-REM sleep was not different from PBO except with 25mg (lower; $P=0.0004$). E2086 was generally well tolerated; most adverse events were mild or moderate in severity.

Conclusion: These data suggest that E2086 alters REM sleep physiology, a core finding of narcolepsy, in a dose-dependent manner. These findings and reports of insomnia with other orexin-receptor agonists in development suggest the need to develop appropriate dose strengths to minimize any adverse impact on sleep parameters.

Support (if any): Eisai Inc.

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0747

ALIXOREXTON IMPROVED PATIENT-REPORTED DISEASE SEVERITY, COGNITIVE FUNCTIONING, AND FATIGUE IN PATIENTS WITH NARCOLEPSY TYPE 1 IN THE VIBRANCE-1 STUDY

Yves Dauvilliers¹, Ron Grunstein², Emmanuel Mignot³, Gert Jan Lammers⁴, David Plante⁵, Erik Buntinx⁶, Rafael Del Rio Villegas⁷, Hailu Chen⁸, Craig Hopkinson⁸, Bhaskar Rege⁸, Julie Himes⁸, Michael Doane⁸, Giuseppe Plazzi⁹

¹Sleep-Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier, ²The Woolcock Institute of Medical Research, Macquarie University, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁴Leiden University Medical Center, ⁵Department of Psychiatry, University of Wisconsin, Madison, ⁶ANIMA Research, ⁷Neurophysiology and Sleep Disorders Unit, Vithas Madrid Hospitals, ⁸Alkermes, Inc., ⁹IRCCS Istituto delle Scienze Neurologiche di Bologna

Introduction: Narcolepsy type 1 (NT1) is characterized by excessive daytime sleepiness, cataplexy, sleep-related hallucinations, sleep paralysis, and disturbed nighttime sleep. Patients also often report cognitive impairment and fatigue, which remain inadequately addressed by current therapies. We describe the effects of alixorexton, an investigational, oral, highly selective orexin 2 receptor agonist on disease severity, cognition, and fatigue in patients with NT1.

Methods: Vibrance-1 (NCT06358950) was a randomized, placebo-controlled phase 2 study that assessed the efficacy, including patient-reported outcomes (PROs), and safety of alixorexton in adult patients with NT1. Patients were randomized 1:1:1:1 to placebo or once-daily alixorexton (4, 6, or 8mg) in the 6-week double-blind treatment period, followed by treatment with alixorexton in an optional 7-week open-label extension (OLE). PROs, including Narcolepsy Severity Scale-Clinical Trials (NSS-CT), British Columbia Cognitive Complaints Inventory (BC-CCI), PROMIS-Fatigue Short-form 6a (PROMIS-Fatigue), and Patient Global Impression of Severity (PGI-S) Cognition and Fatigue items were exploratory outcomes. Statistical testing for PRO endpoints was not adjusted for multiplicity; all p-values were nominal.

Results: Patients received placebo (n=23) or alixorexton (4mg, n=23; 6mg, n=22; 8mg, n=24); 88 completed OLE treatment. For all alixorexton-treated groups, improvements from baseline on NSS-CT score were observed at Week (Wk) 6 (4mg, -9.1; 6mg, -12.4; 8mg, -11.0; all $p<0.001$ versus placebo), Wk8, and Wk12. Improvements from baseline on BC-CCI were seen for all alixorexton-treated groups at Wk2, Wk6 (least squares mean [LSM] change from baseline at Wk6: 4mg, -3.5; 6mg, -3.7; 8mg, -4.8; all $p<0.0001$ versus placebo) and through Wk13. Similarly, most alixorexton-treated patients reported mild/no cognitive impairments at Wk6 on PGI-S Cognition. All alixorexton groups reported improved scores on PROMIS-Fatigue at Wk2, which sustained through Wk6 (LSM change from baseline at Wk6: 4mg, -8.7; 6mg, -12.4; 8mg, -12.9; all $p<0.01$ versus placebo) and through Wk13. A similar trend was seen on PGI-S Fatigue, with most alixorexton-treated patients reporting reduced fatigue severity from baseline at Wk6, and through Wk13.

Conclusion: In the phase 2 Vibrance-1 trial, alixorexton demonstrated nominally significant, clinically meaningful improvements in PROs assessing disease severity, cognitive impairment and fatigue in patients with NT1 at Wk6 that were sustained through 12-13 weeks.

Support (if any): Alkermes, Inc.

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0748

CARDIOVASCULAR FINDINGS IN PATIENTS WITH CENTRAL DISORDERS OF HYPERSOMNOLENCE: PRELIMINARY RESULTS OF THE CLEVELAND CLINIC HYPERSOMNIA CAREPATH

Kelly Kerr¹, Katherine Beshears², Matheus Lima Diniz Araujo¹, Michael Faulx¹, Sikawat Thanaviratananich¹, Marybelle Reyes¹, Nancy Foldvary-Schaefer³

¹Cleveland Clinic, ²Cleveland Clinic Lerner College of Medicine, ³Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Patients with CNS disorders of hypersomnolence (CDH) are at risk of cardiovascular comorbidities that require monitoring. In 2024, we launched a Hypersomnia Carepath (HSCP)

that standardizes access and incorporates cardiovascular quality and safety monitoring.

Methods: HSCP patients on stable pharmacotherapy were enrolled into Q3: 3-month visits for traditional stimulants or Q6: 6-month visits for all other medication groups. Annual EKG was performed in Q3 patients and by provider request in Q6. A board-certified cardiologist classified EKG abnormalities. QTc was calculated using the Framingham equation. Office blood pressure was acquired during the annual in-person visit. Statistics presented as N (%) and mean (SD). Two-sample t-test, chi square, Fisher's exact test, or Kruskal-Wallis test were used, as appropriate.

Results: A total of 119 patients with completed EKG after HSCP enrollment were included: mean age 41.5 ± 12.7 yr, 79.8% female, 84% Caucasian. Of these, 79 (66.4) were taking monotherapy. Traditional stimulants were used by 78 (65.5), solriamfetol 6 (5), modafinil/armodafinil 72 (60.5), oxybates 24 (20.2), and pitolisant 5 (4.2) patients. Monotherapies included: traditional stimulants in 44 (55.7), solriamfetol 1 (1.3%), modafinil/armodafinil 27 (34.2), and oxybates 7 (8.9) patients. Ventricular rate was higher (83 ± 15 vs 73 ± 9 bpm, $p=0.005$) and QT interval shorter (372 ± 26 vs 385 ± 22 ms, $p=0.0115$) with traditional stimulants versus others. QTc (411 ± 17 vs 411 ± 17 ms) and abnormal EKGs (24.4 vs 34.1%) were similar between groups. Among monotherapy users, ventricular rate was greater with traditional stimulants/solriamfetol versus oxybates and modafinil/armodafinil (84 ± 15 vs 68 ± 6 and 75 ± 10 bpm, respectively, $p=0.018$) and no differences were observed in QT, QTc or abnormal EKGs. Office BP was similar between traditional stimulant users and others (systolic: 122 ± 14 vs 121 ± 13 , $p=0.15$; diastolic: 74 ± 14 vs 74 ± 8 , $p=0.29$, respectively). EKGs were classified as abnormal in 33 (27.1), including >1 abnormality in 16 (48.5%). Most common were T wave abnormalities (22.6%) and QRS axis deviation and abnormal distal conduction (15.1% each).

Conclusion: In this CDH cohort, traditional stimulant use relative to all other pharmacotherapies was associated with higher ventricular rate and shorter QT interval but not higher BP or abnormal EKG interpretation. EKGs were classified as abnormal in over one quarter of CDH patients, underscoring the value of proactive cardiovascular monitoring.

Support (if any):

Abstract citation ID: zsag091.0748

0749

EFFECTIVENESS AND SAFETY OF LOW-SODIUM OXYBATE BY PATIENT-REPORTED LONG SLEEP NEED IN DUET STUDY PARTICIPANTS WITH IDIOPATHIC HYPERSOMNIA

David Plante¹, Chad Ruoff², Logan Schneider³, Deborah Nichols⁴, Teresa Steining⁴, Alyssa Cairns⁴, Jing Dai⁴, Marisa Whalen⁴, Yves Dauvilliers⁵

¹Department of Psychiatry, University of Wisconsin- Madison, ²Mayo Clinic, ³Stanford University Center for Sleep Sciences and Medicine, ⁴Jazz Pharmaceuticals, ⁵Sleep-Wake Disorders Centre, Department of Neurology, Hopital Gui de Chauliac, Montpellier, University of Montpellier, INSERM Institute for Neurosciences of Montpellier

Introduction: Low-sodium oxybate (LXB; Xywav®), the only FDA-approved treatment for idiopathic hypersomnia in adults, was evaluated in the phase 4, open-label DUET study (NCT05875974). This post-hoc analysis evaluated subgroups of participants with idiopathic hypersomnia stratified by patient-reported ideal nighttime sleep duration (with [>9 hours] and without [≤ 9 hours] long

sleep need [LSN]), based on Idiopathic Hypersomnia Severity Scale (IHSS) Item 1.

Methods: DUET included screening, 8-day baseline (BL), 2–8-week LXB dose titration/optimization, 2-week stable-dose, 8-day end-of-treatment (EOT), and 2-week safety follow-up periods. Outcomes were Epworth Sleepiness Scale (ESS), IHSS, polysomnographic total sleep time (TST), and Patient Global Impression of Severity (PGI-S) and Change (PGI-C). Least squares mean (LSM) changes (BL-to-EOT) were BL-adjusted; P values are nominal. Treatment-emergent adverse events (TEAEs) were assessed by subgroup.

Results: Of 46 enrolled participants with idiopathic hypersomnia, 45 had BL IHSS data; 24 reported LSN (>9 hours) and 21 reported no LSN (≤ 9 hours). Most (LSN/without LSN) were female (100%/61.9%) and White (91.7%/76.2%), with mean $\pm$ SD age $36.8 \pm 11.1/38.6 \pm 12.1$ years; 20/24 and 19/21 completed the study. BL mean $\pm$ SE (LSN/without LSN) ESS scores were $16.8 \pm 0.5/16.1 \pm 0.7$; LSM changes (95% CI): LSN -9.5 (-11.5 , -7.6 ; $P < 0.0001$; $n=20$), without LSN -7.4 (-9.4 , -5.4 ; $P < 0.0001$; $n=19$). BL mean $\pm$ SE (LSN/without LSN) IHSS total scores were $35.7 \pm 1.3/30.5 \pm 1.8$; LSM changes (95% CI): LSN -18.3 (-22.4 , -14.1 ; $P < 0.0001$; $n=19$), without LSN -12.5 (-16.9 , -8.0 ; $P < 0.0001$; $n=17$). BL mean $\pm$ SE (LSN/without LSN) IHSS long sleep/sleep inertia component scores were $12.5 \pm 0.6/9.2 \pm 0.6$; LSM changes (95% CI): LSN -5.5 (-6.8 , -4.1 ; $P < 0.0001$; $n=19$), without LSN -4.0 (-5.4 , -2.5 ; $P < 0.0001$; $n=17$). BL mean $\pm$ SE (LSN/without LSN) polysomnographic TSTs were $490.0 \pm 26.0/442.7 \pm 24.7$ minutes; LSM changes (95% CI): LSN -53.1 (-92.5 , -13.7 ; $P=0.0097$; $n=20$), without LSN -59.4 (-99.8 , -18.9 ; $P=0.0052$; $n=19$). On the PGI-C, most participants (LSN/without LSN) endorsed improved overall disease (100%/88.2%; $n=19/n=17$) at EOT. TEAEs were reported in 79.2% (LSN) and 66.7% (without LSN); most (LSN/without LSN) were mild (45.8%/42.9%) or moderate (33.3%/23.8%) in severity; 1 (without LSN) was serious (unrelated to study drug).

Conclusion: Participants with or without LSN (>9 hours or ≤ 9 hours, respectively) taking LXB showed improvements in multiple idiopathic hypersomnia symptoms and reduced TST.

Support (if any): Jazz Pharmaceuticals

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0750

EFFICACY OF BACLOFEN IN MANAGEMENT OF CENTRAL HYPERSOMNIAS: A 5-YEAR RETROSPECTIVE SINGLE-CENTER ANALYSIS OF CLINICAL AND PATIENT-REPORTED OUTCOMES

Natalia Dubok, Leah Miranda, Gerard Meskill, Sarah Meskill
Tricoastal Narcolepsy and Sleep Disorder Center, PLLC

Introduction: Central hypersomnias, narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and idiopathic hypersomnia (IH) are chronic disorders marked by excessive daytime sleepiness and fragmented sleep. Beyond oxybates, pharmacologic options to enhance sleep quality are limited. Baclofen, a GABA-B receptor agonist, has been found to enhance sleep consolidation and slow-wave sleep, which is often disrupted in patients with central hypersomnia. Data on efficacy of this off-label treatment remain limited.

Methods: Electronic health records from 12/05/2020 through 12/05/2025 were reviewed for patients with NT1, NT2, or IH and who were prescribed baclofen in a single center in Texas. Extracted variables included demographics, diagnosis, nightly

dose, continuation of therapy, concomitant use of oxybates, and patient-reported benefit.

Results: Forty-five patients on baclofen therapy were identified: NT1 (n=18), NT2 (n=24), and IH (n=3). Of these, 38 (85%) were female and 7 (15%) were male. The cohort's mean age was 37.9 years and mean BMI was 27.4 kg/m². Baclofen doses ranged from 5 to 30 mg nightly, with the most common range 10 to 20 mg. Twenty-seven patients (60%) did a trial of oxybate prior to initiation of baclofen and were not on oxybate when starting baclofen. Thirteen (48%) of those continued on baclofen. Eight other patients (17%) did trial of baclofen with oxybates nightly and currently 7 (87.5%) continued on both. Of the 45 patients, 34 had data available about subjective improvement. Eighteen patients (53%) reported subjective improvement in sleep continuity: 4 NT1 (22%), 13 NT2 (54%), 1 IH (33%). A total of 15/45 (33%) of patients discontinued baclofen due to either an absence of benefit (7) or other reasons (8). Seven patients without follow-up remain under active evaluation.

Conclusion: In this five-year retrospective analysis of 45 patients with central hypersomnias, baclofen was associated with subjective improvement in sleep quality. Though a small sample size, these findings support further evaluation of baclofen as a potentially effective agent in patients with central hypersomnias.

Support (if any): N/A

Abstract citation ID: zsag091.0750

0751

IMPROVEMENT IN SLEEPINESS WITH ONCE-NIGHTLY SODIUM OXYBATE IN PEOPLE WITH NARCOLEPSY TYPE 1 AND NARCOLEPSY TYPE 2: A SPECIALTY PHARMACY DATA ANALYSIS

Sarah Meskill¹, Laura Herpel², Michael Thorpy³, Chad Ruoff⁴, Diana Carino⁵, Erin Buysman⁶, Michelle Vu⁶, Brian Abaluck⁷, Jennifer Gudeman⁷

¹Tricoastal Narcolepsy and Sleep Disorder Center, ²Bogan Sleep Consultants, ³Albert Einstein College of Medicine, ⁴Mayo Clinic, ⁵Optum Frontier Therapies, ⁶Optum Life Sciences, ⁷Avadel Pharmaceuticals

Introduction: Once-nightly sodium oxybate (ON-SXB; LUMRYZTM) is approved to treat excessive daytime sleepiness (EDS) or cataplexy in patients ≥7 years of age with narcolepsy. Findings from 2 studies have demonstrated improvements in objective and subjective EDS with ON-SXB in patients with narcolepsy type 1 (NT1) or 2 (NT2) (NCT02720744, NCT06792708). To evaluate the effect of ON-SXB on EDS in a larger, more diverse narcolepsy patient population, changes in Epworth Sleepiness Scale (ESS) score were analyzed using specialty pharmacy data.

Methods: Demographic/clinical data were collected from Optum Frontier Therapies pharmacy for adults with NT1 or NT2 with ≥1 filled ON-SXB prescription, ≥1 ON-SXB clinical assessment, and ≥1 follow-up ESS score (6/1/2023-9/30/2024). ESS total scores were assessed at baseline and at each follow-up assessment after ON-SXB initiation. ESS assessment participation was voluntary. Data were analyzed descriptively and stratified by narcolepsy subtype.

Results: Of 452 patients identified, 195 had ≥1 follow-up ESS score and reported narcolepsy type (NT1, n=123 [63%; mean age, 38.6 years; female, 69%]; NT2, n=72 [37%; mean age, 40.7 years; female, 74%]). More patients with NT1 vs NT2 (72% vs 58%) had any prior oxybate use. Baseline concomitant stimulant/wake-promoting agent use was 58% and 64% for NT1 and NT2, respectively. Mean (SD) ESS total scores at baseline were 12.1 (5.7) and 12.2 (5.3) for patients with NT1 and NT2, respectively; 31% of NT1 and 33% of NT2 had severe EDS. For both subtypes, mean (SD) ESS scores were within the normal EDS range (≤10) by the first follow-up (median time, 52 days; NT1, 10.0 [5.5]; NT2, 9.6 [4.8]). At first follow-up, more than half of patients in the NT1 (55%) and NT2 (54%) subgroups achieved normal levels (ESS total score ≤10) of sleepiness, while 20% of NT1 patients and 10% of NT2 patients had severe EDS. Mean (SD) change from baseline in ESS score was -2.1 (4.3) and -2.6 (5.3) in the NT1 and NT2 subgroups, respectively.

Conclusion: In this real-world dataset, both NT1 and NT2 patients quickly experienced clinically meaningful improvements in ESS score after initiating ON-SXB. These results support ON-SXB as an effective EDS treatment, regardless of narcolepsy subtype.

Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsag091.0751

0752

ONCE-NIGHTLY SODIUM OXYBATE IMPROVES SYMPTOMS IN PEOPLE WITH NARCOLEPSY: FINAL RESULTS FROM THE REAL-WORLD REFRESH STUDY

Sarah Meskill¹, Gerard Meskill¹, Asim Roy², Adrian Santamaria³, Robyn Porpiglio⁴, Oktai Mamedov⁵, Sally Ibrahim⁶, Omavi Bailey⁷, Richard Bogan⁸, Laura Herpel⁹, Matthew Davis¹⁰, Jeremy McConnell¹¹, Gretchen Richards¹², Brian Abaluck¹², Jennifer Gudeman¹²

¹Tricoastal Narcolepsy and Sleep Disorder Center, PLLC, ²Ohio Sleep Medicine Institute, ³Northwest Houston Neurology, ⁴Ghaly Sleep Management Services, LLC, ⁵Comprehensive Sleep Center, ⁶Case Western Reserve and University Hospitals Cleveland Medical Center, ⁷Biorhythms, ⁸University of South Carolina School of Medicine, ⁹Bogan Sleep Consultants, ¹⁰Patient First MD, ¹¹Florida Sleep Specialists, ¹²Avadel Pharmaceuticals

Introduction: Once-nightly sodium oxybate (ON-SXB; LUMRYZTM) is approved for excessive daytime sleepiness or cataplexy in patients ≥7 years of age with narcolepsy. REFRESH (NCT06792708) is a real-world study of ON-SXB in adults with narcolepsy.

Methods: Adults with narcolepsy who switched from twice-nightly oxybates (TN-OXB; switch) or were not taking oxybates upon study onset (not-oxybate-treated; ie, previous TN-OXB use or oxybate-naïve) were eligible. ON-SXB was titrated in 1.5-g increments weekly or more gradually, based on efficacy/tolerability, to a maximum dose of 9 g/night. Participants completed the Epworth Sleepiness Scale (ESS), Narcolepsy Severity Scale (NSS), and Sheehan Disability Scale (SDS) monthly for 4 months. Patient and Clinician Global Impression of Change (PGI-C; CGI-C) were assessed at end-of-study (EOS). Adverse drug reactions (ADRs; ie, study drug-related adverse events) were reported.

Results: Of 86 participants screened, 71 initiated ON-SXB treatment (current TN-OXB use, $n=25$ [35%]; not-oxybate-treated, $n=46$ [65%]; prior TN-OXB use, $n=10$ (22%); oxybate-naïve, $n=36$ (78%)); 51 completed the study. Respective mean (SD) ESS scores for switch and not-oxybate-treated participants were significantly improved from baseline (10.4 [5.4] and 14.9 [4.6]) vs month 4 (6.3 [3.9] and 8.5 [4.6]); mean [SD] change from baseline: switch, -3.1 [2.9], $P < 0.001$; not-oxybate-treated, -6.6 [5.1], $P < 0.001$. Respective mean (SD) NSS scores for switch and not-oxybate-treated participants were moderate at baseline (16.0 [8.1] and 24.4 [9.8]) and mild at month 4 (9.8 [9.0] and 13.5 [9.1]); mean [SD] change from baseline: switch, -5.8 [6.0], $P < 0.001$; not-oxybate-treated, -10.9 [5.1], $P < 0.001$. Respective mean (SD) SDS scores for work/school, social life, and family life/home domains at baseline and month 4 were 4.3 (2.5) and 2.5 (2.4), 4.9 (2.6) and 3.0 (2.6), and 5.3 (2.6) and 3.2 (2.8) for switch and 6.0 (3.0) and 3.6 (2.8), 6.4 (2.6) and 3.6 (2.6), and 6.5 (2.8) and 3.6 (2.8) for not-oxybate-treated participants. At EOS, 70% and 76% of switch and 91% and 88% of not-oxybate-treated participants improved on PGI-C and CGI-C, respectively. ADRs were consistent with known oxybate ADRs.

Conclusion: ON-SXB treatment was associated with statistically and clinically significant improvements in symptoms, functional impairment, and burden of narcolepsy, regardless of direct switch from TN-OXB.

Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsa091.0752

0753

OXYBATE TREATMENT PATTERNS IN PATIENTS WITH NARCOLEPSY: COHORT DATA FROM MAYO CLINIC AND DUKE HEALTH

Melissa Lipford¹, Marjorie Soltis², Allison Smither³, Jennifer Gudeman⁴, Lois Krahn¹

¹Mayo Clinic, ²Duke University, ³Inference, ⁴Avadel Pharmaceuticals

Introduction: Sodium oxybate is strongly recommended by the American Academy of Sleep Medicine for the treatment of narcolepsy, a chronic sleep disorder characterized by excessive daytime sleepiness (EDS). This study was conducted to characterize demographic characteristics and concomitant medication use of patients with narcolepsy treated or not treated with oxybates (OXB).

Methods: An electronic health record-based search identified first-time patients from Mayo Clinic and Duke Health between 2002-2024 and 2012-2024, respectively. Patients had ≥ 1 narcolepsy-specific ICD-9/10 code and ≥ 1 diagnostic mention of narcolepsy in clinical notes (via natural language processing algorithm). Patients from both Mayo Clinic and Duke Health who were or were not treated with OXB were identified. Data were analyzed descriptively.

Results: Of 4722 patients, 654 (Mayo Clinic, $n=378$; Duke Health, $n=276$) received OXB, and 4068 (Mayo Clinic, $n=2800$; Duke Health, $n=1268$) received non-OXB treatments. The majority of patients were white (OXB-treated: 92.1%, 73.6%; non-OXB-treated: 91.1%, 69.2%) and female (OXB-treated: 68.3%, 76.8%; non-OXB-treated:

61.7%, 68.1%). Most OXB-treated patients (65.3%; 63.4%) had narcolepsy type 1 (NT1); the majority of non-OXB-treated patients (78.1%; 64.0%) had narcolepsy type 2 (NT2). The mean (SD) age of the OXB-treated cohort was younger than the non-OXB-treated cohort at the time of diagnosis (OXB-treated: 33.9 [15.3] years, 35.7 [13.2] years; non-OXB-treated: 45.5 [19.2] years, 42.5 [17.8] years). For both cohorts, the most common concomitant medications were stimulants (OXB-treated: 50.3%, 42.8%; non-OXB-treated: 41.8%, 35.2%).

Conclusion: In this retrospective analysis of nearly 5000 patients from Mayo Clinic and Duke Health, approximately 1 in 8 received OXB. While sodium oxybate has been approved for > 2 decades and is strongly recommended for treatment of both EDS and cataplexy in narcolepsy, substantially greater OXB utilization was observed in patients with NT1. As both patients with NT1 and NT2 can experience other narcolepsy symptoms, further OXB-related education remains critical—particularly on the efficacy of sodium oxybate in the treatment of NT2.

Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsa091.0753

0754

PATIENT EXPERIENCE OF FATIGUE AND ASSESSMENT IN NARCOLEPSY: A CROSS-SECTIONAL STUDY

Gerard Meskill¹, Christopher Drake², Salvatore Insana³, Elizabeth Merikle⁴, Kristina Davis⁴, David Seiden³, Eric Bauer³, Maju Matthews³, Kumar Budur³

¹Tricoastal Narcolepsy and Sleep Disorders Center, PLLC, ²Henry Ford Health System, ³Harmony Biosciences, ⁴Fortrea Inc.

Introduction: Fatigue and excessive daytime sleepiness (EDS) are symptoms of narcolepsy and are often described as overlapping. Among patients with narcolepsy, EDS is commonly reported with and without fatigue, and vice versa, suggesting that these symptoms are indeed distinct. However, there is no validated patient-reported outcome measure (PROM) designed specifically to evaluate fatigue in patients with narcolepsy. The aims of this study were to examine the relationship between fatigue and EDS in narcolepsy, and to evaluate the performance of a PROM to assess fatigue in narcolepsy.

Methods: This was a cross-sectional, mixed-methods study in adults (aged ≥ 18 years) with narcolepsy (type 1 or 2) who reported fatigue ≥ 3 days per week. Patients completed two 45-minute qualitative interviews to 1) describe the experience of fatigue and EDS in the context of narcolepsy, and 2) facilitate evaluation of a fatigue-specific PROM (Patient-Reported Outcomes Measurement Information System Fatigue Short Form 7a [PROMIS-Fatigue SF 7a]).

Results: Of the 117 patients with narcolepsy screened, 26 (22.2%) participated in the interviews (mean [SD] age, 39.5 [11.3] years; 73% were female). Common responses (% of patients) to describe fatigue in narcolepsy were lack of energy (92%), cognitive difficulties (81%), physical sensations (eg, heaviness [69%]), and emotional effects (eg, grumpy [61%]), whereas EDS was generally described in terms of an overwhelming, urgent, and sometimes involuntary need to sleep. Overall, 80% of patients described

fatigue and daytime sleepiness as distinct symptoms. The qualitative analysis informed the development of a conceptual model for fatigue in narcolepsy that consisted of physical, cognitive, emotional, and social domains. All patients felt that the content in the PROMIS-Fatigue SF 7a was relevant to their experience of fatigue in narcolepsy. More than half of the patients felt that PROMIS-Fatigue SF 7a items pertaining to cognitive function and impacts at work best captured their experience with fatigue.

Conclusion: Fatigue is a distinct symptom of narcolepsy and can be differentiated from EDS. The PROMIS-Fatigue SF 7a is a fit-for-purpose PROM to assess fatigue in future clinical trials.

Support (if any): Harmony Biosciences

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0755

PATIENT-REPORTED IMPROVEMENT IN HYPERSOMNOLENCE MEASURES IN PARTICIPANTS WITH NARCOLEPSY TAKING >9 GRAM DOSAGE OF LOW-SODIUM OXYBATE IN THE DUET STUDY

Richard Bogan¹, Chad Ruoff², David Plante³, Deborah Nichols⁴, Teresa Steininger⁴, Jing Dai⁴, Thomas Measey⁴, Marisa Whalen⁴, Alyssa Cairns⁴, Logan Schneider⁵, Jerald Simmons⁶

¹University of South Carolina School of Medicine, ²Mayo Clinic,

³Department of Psychiatry, University of Wisconsin, Madison,

⁴Jazz Pharmaceuticals, ⁵Stanford University Center for Sleep Sciences and Medicine, ⁶Comprehensive Sleep Medicine

Associates

Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment; NCT05875974) was the first study to evaluate effectiveness/safety of low-sodium oxybate (LXB; Xywav[®]) >9 g/night (outside the recommended range: 6–9 g/night). This analysis evaluated changes in patient-reported hypersomnolence measures in participants with narcolepsy taking LXB >9 g/night compared with LXB 9 g/night.

Methods: DUET was a phase 4, prospective, open-label study with screening, 8-day LXB 9 g/night (9g-baseline), titration/optimization, stable-dose, and 8-day end-of-treatment (EOT) optimized LXB >9 g/night (up to 12g; >9g-EOT) periods. Patient-reported measures included Epworth Sleepiness Scale (ESS), electronic sleep diaries (completed daily during 9g-baseline and >9g-EOT; subjective total sleep time [TST], number of awakenings, sleep efficiency [TST divided by time in bed], sleep quality [5-point scale; “very good” to “very poor”], and how rested/refreshed the participant felt upon awakening [5-point scale; “very well” to “not at all”]), Karolinska Sleepiness Scale (KSS; administered 90 minutes post-polysomnography awakening at 9g-baseline and >9g-EOT), and Functional Outcomes of Sleep Questionnaire-10 (FOSQ-10). LSM differences (95% CI) from 9g-baseline to >9g-EOT (nominal P-values) were 9g-baseline-adjusted.

Results: Forty-eight participants took LXB >9g (mean±SD age: 39.2±10.9 years; 62.5% female). Total stable-dose LXB (mean±SD) was 11.1±1.0 g/night (n=45). From 9g-baseline to >9g-EOT, ESS scores improved (LSM [95% CI]: -3.1 [-4.2, -1.9]; P< 0.0001; n=44), nocturnal TST increased (0.3h [0.1, 0.4]; P=0.0163; n=26), sleep

efficiency increased (3.8% [1.7, 5.9]; P=0.0011; n=26), and number of awakenings remained stable (-0.2 [-0.7, 0.3]; P=0.3959; n=26). Percentage of participants rating sleep quality as “very good”/“good” increased from 26.9% (9g-baseline) to 61.5% (>9g-EOT), as did rested sleep (“very well”/“well”/“somewhat” rested) from 57.7% to 69.2%, respectively. From 9g-baseline to >9g-EOT, KSS scores decreased (-0.9 [-1.4, -0.4]; P=0.0004; n=39); FOSQ-10 scores also increased (1.3 [0.5, 2.0]; P=0.0014; n=40). Of 48 participants, 36 (75.0%) experienced ≥1 TEAE (mostly mild/moderate and 1 serious [syncope, unrelated to treatment]). No changes in respiratory polysomnography measures were observed.

Conclusion: Participants with narcolepsy who optimized to LXB >9 g/night, relative to 9 g/night, reported increased sleep quality and restfulness that paralleled improvements in daytime sleepiness and daytime functioning. TEAEs were consistent with those at lower dosages.

Support (if any): Jazz Pharmaceuticals

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0756

PHASE-3 CLINICAL DEVELOPMENT OF SAMELISANT: RATIONALE AND STUDY DESIGN FOR TREATING EXCESSIVE DAYTIME SLEEPINESS IN PATIENTS WITH NARCOLEPSY

Vinod Kumar Goyal, Anil Shinde, Ramkumar Subramanian, Pradeep Jayarajan, Veera Raghava Chowdary Palacharla, Dhanunjay Dogiparti, Santosh Kumar Pandey, Ramakrishna Nirogi
Suven Life Sciences

Introduction: Samelissant is a potent and selective histamine H₃ receptor inverse agonist that modulates the monoaminergic system, implicated in the regulation of sleep-wake cycle. In pre-clinical models of narcolepsy, Samelissant demonstrated robust wake-promoting and anticataplectic effects. The Phase-3 study is designed to evaluate the efficacy and safety of Samelissant for the treatment of excessive daytime sleepiness (EDS) in patients with narcolepsy.

Methods: Samelissant was evaluated in orexin-knockout mice and orexin-B saporin (SAP) lesioned rats to characterize its effects on sleep-wake regulation and cataplexy using electroencephalography. Samelissant was subsequently investigated as monotherapy in a Phase-2 proof-of-concept study (NCT04072380) for the treatment of EDS in narcolepsy patients. Based on the strong preclinical findings and positive results from the Phase-2 study, a Phase-3 clinical study has been designed.

Results: In orexin-knockout mice, Samelissant significantly increased time spent in wakefulness and reduced cataplexy-like episodes. In orexin-B SAP-lesioned rats, Samelissant produced wake-promoting effects and significantly decreased direct wake-to-REM (DREM) transitions, a characteristic feature of narcolepsy. In the Phase-2 clinical study, Samelissant demonstrated a statistically significant and clinically meaningful improvement in EDS. At Day 14, Samelissant produced a 2.1-point reduction in Epworth Sleepiness Scale (ESS) total score compared with placebo (p< 0.024). Samelissant was generally safe and well tolerated in the study population. The proposed global Phase-3 study will be a randomized, double-blind, placebo-controlled,

parallel-group study enrolling approximately 240 patients with a confirmed diagnosis of narcolepsy. Following a 4-week screening period, eligible participants will undergo 12-week treatment and a 4-week follow up period. The primary endpoint will be the change from Baseline in ESS total score at Week 12. Secondary endpoints will include changes from Baseline in Maintenance of Wakefulness Test (MWT) score, CGI-S, weekly rate of cataplexy (WRC) and Narcolepsy Severity Scale (NSS-CT) for NT1 at Week 12. Safety and tolerability will be assessed by adverse event incidence, vital signs, laboratory tests, ECGs, and suicidality.

Conclusion: The Phase-3 study is expected to begin in the first half of 2026. Outcomes from this study will provide insights into the therapeutic potential of Samelisant for the treatment of EDS in narcolepsy.

Support (if any): None

Abstract citation ID: zsa091.0756

0757

SLEEPINESS IMPROVEMENT WITH ONCE-NIGHTLY SODIUM OXYBATE IN PATIENTS WITH AND WITHOUT PRIOR TWICE-NIGHTLY OXYBATE USE: SPECIALTY PHARMACY DATA ANALYSIS

Laura Herpel¹, Michael Thorpy², Sarah Meskill³, Chad Ruoff⁴, Erin Buysman⁵, Diana Carino⁶, Michelle Vu⁵, Brian Abaluck⁷, Jennifer Gudeman⁷

¹Bogan Sleep Consultants, ²Albert Einstein College of Medicine, ³Tricoastal Narcolepsy and Sleep Disorder Center, ⁴Mayo Clinic, ⁵Optum Life Sciences, ⁶Optum Frontier Therapies, ⁷Avadel Pharmaceuticals

Introduction: Once-nightly sodium oxybate (ON-SXB) is approved to treat cataplexy or excessive daytime sleepiness (EDS) in patients ≥ 7 years of age with narcolepsy. ON-SXB demonstrated significant improvements in both objective (Maintenance of Wakefulness Test) and subjective (Epworth Sleepiness Scale [ESS] score) measurements of sleepiness in the REST-ON trial and via the ESS in the real-world REFRESH study. Assessing ON-SXB ESS data from a specialty pharmacy and outside of clinical studies further informs the generalizability of effectiveness.

Methods: Demographic and clinical data were collected from Optum Frontier Therapies pharmacy for patients with ≥ 1 filled ON-SXB prescription, ≥ 1 ON-SXB-related clinical assessment, and ≥ 1 follow-up ESS score (6/1/2023-9/30/2024). Participation in ESS assessment was voluntary. ESS scores were assessed for patients who switched from twice-nightly oxybate (TN-OXB) treatment (first ON-SXB prescription filled ≤ 30 days of last TN-OXB prescription [switch]) and those new to oxybate or with > 30 days between TN-OXB and ON-SXB prescription fills (not-on-oxybate) who had ESS data at initial ON-SXB prescription and at each follow-up assessment.

Results: Of 452 identified patients, 215 had ≥ 1 follow-up ESS score (switch, $n=82$ [mean age, 38.4 years; female, 71%]; not-on-oxybate, $n=133$ [mean age, 40.0 years; female, 71%]). Of patients who had any prior oxybate use (switch, 100%; not-on-oxybate, 46%), the most common prior oxybate was mixed-salt oxybates (switch, 59%; not-on-oxybate, 70%). Stimulants/wake-promoting agents were taken by 51% of switch and 65% of not-on-oxybate patients. Baseline mean (SD) ESS scores were 11.3 (5.5) for switch and 12.5 (5.6) for not-on-oxybate patients; 23% of switch and 38% of not-on-oxybate patients experienced severe EDS. By the first follow-

up (median [IQR], 49 [28-94] days), mean (SD) ESS scores were within the normal EDS range with ON-SXB for both subgroups (ie, ESS < 10 ; switch, 9.7 [5.5]; not-on-oxybate, 9.5 [5.2]); the majority reported normal levels of daytime sleepiness (switch, 56%; not-on-oxybate, 57%). Mean (SD) change in ESS score from baseline to follow-up was -1.6 [4.5] for switch and -3.1 [5.0] for not-on-oxybate groups.

Conclusion: Patients who initiated ON-SXB experienced improvements in daytime sleepiness regardless of prior TN-OXB use, and many achieved normal levels of daytime sleepiness in ≤ 2 months of starting ON-SXB.

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0758

SOLRIAMFETOL AND PREVALENCE OF FALSE-POSITIVE URINE TOXICOLOGY SCREENS FOR AMPHETAMINES

Ramiz Nazir¹, Lara Asroui², Mahesheema Ali³, Dennis Auckley⁴

¹MetroHealth - Case Western Reserve University, ²The MetroHealth System/Case Western Reserve University, ³Department of Pathology, MetroHealth Medical Center, Case Western Reserve University, Cleveland, Ohio, ⁴Case Western Reserve University

Introduction: Solriamfetol has been reported to cause a false positive for amphetamines on urine toxicology screening. Similarities in the chemical structures and mechanisms of action (competitive inhibition resulting in reuptake inhibition of the sympathomimetic amines) may result in solriamfetol potentially binding to assay reagents that were designed for amphetamines, leading to false positive screens on many of the commonly used immunoassay platforms. As part of standard practice at our institution, urine toxicology screens are performed on patients taking solriamfetol. We sought to determine the rate of false positive amphetamine urine toxicology screens in patients on solriamfetol.

Methods: This was an IRB approved retrospective chart review. Patients prescribed solriamfetol at our institutions had their charts extracted for age, gender, race, BMI, sleep diagnosis, duration and dose of solriamfetol therapy, urine toxicology results (including confirmatory testing of positive screens, if available), concomitant medications and medical comorbidities. All controlled substance use was verified in the state-reported controlled substance use monitoring system.

Results: We found 41 patients on solriamfetol that underwent urine toxicology screening. Demographics included an average age of 46 years old, average BMI of 29.8 kg/m², and 78% were women. Diagnoses included were idiopathic hypersomnia (6 (14.6%)), residual sleepiness from OSA (16 (39%)), and narcolepsy (19 (46.3%)). Eight (19.5%) of these patients had positive urine toxicology amphetamine screens at some point while taking solriamfetol, though 5 of these were on amphetamine-dextroamphetamine during their urine toxicology screens. Three (7.3%) remaining patients had positive urine toxicology screens for amphetamines despite no concomitant amphetamine use (verified) or illicit drug use. Confirmatory testing in 2 of 3 was negative for amphetamines (the 3rd did not have a confirmation test). In addition, 2 of 3 were also on fluoxetine at the time of screening, but the dose of fluoxetine was deemed to be insufficient to interfere with the testing results.

Conclusion: 7% of patients using solriamfetol had false positive urine toxicology screens for amphetamines in this study. Prescribers of solriamfetol should be aware of this potential issue and perform confirmatory testing when urine toxicology screens are positive for amphetamines without a reasonable explanation.

Support (if any):

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0759

TARGETING SLEEP INERTIA IN SLEEP DISORDERS: A RETROSPECTIVE CASE SERIES OF EVENING-DOSED EXTENDED-RELEASE METHYLPHENIDATE

Sneha Ottra¹, John Das², Sally Ibrahim³, Moshe Prero¹, Carolyn Ievers-Landis⁴

¹University Hospitals/Cleveland Medical Center, ²University Hospitals / Case Western Reserve University School of Medicine, ³Case Western Reserve and University Hospitals Cleveland Medical Center, ⁴Rainbow Babies & Children's Hospital/University Hospitals Cleveland Medical Center

Introduction: Sleep inertia—prolonged grogginess and confusion upon awakening—causes disabling impairment in hypersomnolence disorders, often persisting despite standard daytime stimulants. This leaves patients with functional limitations before medication onset. This case series evaluates evening-dosed, delayed-release methylphenidate for refractory sleep inertia.

Methods: A retrospective pre-post analysis was performed on a case series of 12 patients (age range: 12–24 years) treated for sleep disorders with residual sleep inertia. Diagnoses included idiopathic hypersomnia, circadian rhythm sleep-wake disorder, post-viral hypersomnia, and narcolepsy types 1 and 2. Patients were treated with evening-dosed delayed-release methylphenidate with final titrations ranging from 20 mg to 80 mg. Clinical metrics using validated sleep measures were collected to compare baseline (pre) and follow-up (post) metrics. The primary outcome was the Epworth Sleepiness Scale (ESS). Secondary outcomes included the Insomnia Severity Index (ISI), PROMIS Sleep-Related Impairment (SRI), Sleep Disturbance (SD), and the Clinical Global Impression (CGI) scale. Statistical significance of mean changes was assessed using paired sample t-tests.

Results: Evening-dosed long-acting methylphenidate improved sleepiness from 18.33 (SD=5.03) to 7.83 (SD=1.53) (reduction 10.50; 95% CI: 7.13–13.87; $t=6.86$, $p<0.0001$). Patients achieved normalization ($ESS<11$). Regarding secondary outcomes: PROMIS-SRI improved from 20.25 (SD=8.99) to 14.25 (SD=5.91) (Mean reduction 6.00; 95% CI: -12.17 to 24.17; $t=1.05$, $p=0.37$). ISI improved from 18.25 (SD=4.50) to 12.00 (SD=2.16) (Mean reduction 6.25; 95% CI: -0.40 to 12.90; $t=2.99$, $p=0.06$), suggesting no insomnia exacerbation. PROMIS-SD remained stable (18.43 [SD=9.91] to 16.14 [SD=6.12]; Mean reduction 2.29; 95% CI: -8.35 to 12.93; $t=0.53$, $p=0.62$). CGI-Sleep Inertia improved significantly from 3.00 (SD=0.00) to 1.56 (SD=0.53) (Mean reduction 1.44; 95% CI: 1.04–1.84; $t=8.18$, $p<0.0001$), indicating minimal symptoms. Adherence was rated "good" or "acceptable."

Conclusion: This case series suggests that evening administration of delayed-release methylphenidate is associated with clinically significant reductions in daytime sleepiness and sleep inertia. A key limitation is that patients were concurrently treated with other stimulants or wake-promoting agents; thus, observed improvements likely reflect an additive benefit rather than an isolated effect. Findings suggest that targeting the morning "wake-up" phase with evening chronotherapy is a viable strategy for refractory sleep inertia in complex sleep disorders.

Support (if any): None

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0760

TRACKING COMPLIANCE WITH LOWER-DOSE TITRATION OF TWICE-NIGHTLY OXYBATES IN NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA

Arooba Shaikh, Trina Nguyen, Sarah Meskill, Gerard Meskill
Tricoastal Narcolepsy and Sleep Disorder Center, PLLC

Introduction: Oxybate salts are effective agents for narcolepsy type 1 (NT1), type 2 (NT2), and idiopathic hypersomnia (IH), but utilization remains low due to adverse events, as well as patient and/or prescriber apprehension. For twice-nightly oxybates (TN-OXB), the traditional titration schedule begins at 4.5 grams split into two even nightly doses ("4.5GSTD"). This study aims to characterize outcomes utilizing lower-dose titration schedules.

Methods: We conducted a manual chart review of patients initiated on TN-OXB from 2021–2025. Inclusion required an initial dose <4.5 GSTD. For each patient, we collected diagnosis (NT1/NT2/IH), age, gender, and BMI. Follow-up visit documentation was analyzed for symptom improvement, reason(s) for discontinuation, and final stabilized dose among those who remained on therapy. Primary outcomes were discontinuation rate and tolerability with lower-dose titrations compared to those using historical standard-dose titrations.

Results: From 2021–2025, 61 patients initiated a TN-OXB titration <4.5 GSTD: 51 female (83.6%), 10 male (16.4%). There were 26 NT1 (42.6%), 22 NT2 (36.1%), and 13 IH (21.3%) patients. Nineteen (31%) were actively titrating at the time of this publication and were omitted from analysis. Of the remaining 42 patients, 31 (73.8%) continued TN-OXB, while 11 (26.2%) discontinued therapy. Among NT1 patients, 15 (75%) continued, 5 (25%) discontinued. Among NT2 patients, 10 (71.4%) continued, 4 (28.6%) discontinued. Among IH patients, 6 (75%) continued, 2 (25%) discontinued. Eleven (26.2%) patients' therapies were optimized with a stable dose <4.5 GSTD.

Conclusion: The discontinuation rate (26.2%) in lower-dose TN-OXB titration is similar to published data (26.6%) in a recent large real-world clinical practice analysis with traditional titration schedules (Drakatos P. et al., Sleep 2017;35:80–84). Given the well-known patient and prescriber apprehension to oxybates due to concerns about CNS depression among other potential adverse events, there may still be considerable advantage in lower-dose TN-OXB titration, as this method may mitigate such fears and thus increase utilization of this standard-of-care therapy for central hypersomnias. Additionally, this method led to discovery of a stable dose <4.5 GSTD in 26.2% of patients, which likely would not have been discovered using a traditional titration schedule.

Support (if any):

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0761

WAKING UP TO MODERN DECISION-MAKING: INTEGRATING PATIENT PERSPECTIVES INTO NARCOLEPSY MANAGEMENTAnne Morse¹, Logan Schneider², Tammy Anderson³, Felicia Oyedepo⁴, Chloe Billings⁴, Brian Moss⁴¹Geisinger Medical Center, Janet Weis Children's Hospital,²Stanford University Center for Sleep Sciences and Medicine,³Wake Up Narcolepsy, ⁴EfficientCME

Introduction: Narcolepsy type 1 (NT1) and narcolepsy type 2 (NT2) present with heterogeneous symptoms beyond excessive daytime sleepiness (EDS), contributing to delayed diagnosis and functional impairment. Given variable symptoms and an expanding therapeutic armamentarium, management of narcolepsy remains highly individualized. To better characterize real-world experiences, including diagnostic pathways, treatment patterns, and unmet needs, a patient survey was conducted.

Methods: A 31-item online survey was administered in September 2025. Participants with self-reported narcolepsy were recruited through Wake Up Narcolepsy. A small honorarium was provided. Responses were aggregated and analyzed for incorporation within a CME activity.

Results: Data were obtained from 99 patients (68% NT1; 31% NT2; 86% female, 61% aged 25-44). Prior to diagnosis, all patients experienced EDS and most reported disrupted nighttime sleep (DNS; 79% NT1, 77% NT2) and cognitive challenges (81% NT1 and NT2). Hallucinations and sleep paralysis were more common in NT1 (~60%) but prevalent in NT2 (45% and 26%, respectively). Most patients (76%) were initially misdiagnosed, most commonly with depression (56%), anxiety (49%), and/or attention-deficit/hyperactivity disorder (35%). These were also the most frequently reported comorbidities, present in 45%, 52%, and 40% of respondents. Many patients (40% NT1, 52% NT2) consulted >4 providers before receiving a formal diagnosis. The most challenging symptoms to manage were EDS (90%), cognitive dysfunction (72%), and DNS (40%). Common treatments included stimulants (41%), solriamfetol (25%), pitolisant (23%), and low sodium oxybate (22%). Only 27% felt their regimen fully met their needs, although 42% reported "a lot" of improvement. Only 13% felt their provider fully understood symptom impacts on daily life. Profound challenges in psychosocial functioning were noted in NT1 and NT2, particularly difficulty concentrating or expressing thoughts (90%), memory problems (84%), and difficulty maintaining social relationships (68%). Just 19% reported being connected with support groups by their healthcare team.

Conclusion: Symptom misattribution and comorbidities are common in narcolepsy, emphasizing a need for enhanced clinical vigilance. Despite treatment, patients experience significant residual cognitive and psychosocial burden and often feel misunderstood, yet they are infrequently connected to support groups by clinicians. Results underscore the need for enhanced patient-centered management.

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0762

IMPROVEMENTS IN SLEEP INERTIA WITH LOW-SODIUM OXYBATE TREATMENT IN PARTICIPANTS WITH IDIOPATHIC HYPERSOMNIA IN THE DUET STUDYDeborah Nichols¹, Logan Schneider², Chad Ruoff³, Jing Dai¹, Teresa Steininger¹, Marisa Whalen¹, Alyssa Cairns¹, David Plante⁴, Hans Van Dongen⁵¹Jazz Pharmaceuticals, ²Stanford University Center for Sleep Sciences and Medicine, ³Mayo Clinic, ⁴Department of Psychiatry, University of Wisconsin, Madison, ⁵Sleep and Performance Research Center, Washington State University Health Sciences Spokane

Introduction: People with idiopathic hypersomnia often experience sleep inertia, characterized by profound difficulty waking up with grogginess, disorientation, and cognitive impairment immediately after awakening. This post-hoc analysis of the DUET study (NCT05875974) evaluated objective and subjective sleep inertia in participants with idiopathic hypersomnia taking low-sodium oxybate (LXB; Xywav[®]) stratified by patient-reported ideal nighttime sleep duration (with >9h] and without [≤9h] long sleep need [LSN]), based on Idiopathic Hypersomnia Severity Scale (IHSS) item 1.

Methods: DUET was a phase 4, prospective, open-label study of LXB with baseline (BL), titration/optimization, stable-dose, and end-of-treatment (EOT) periods. Exploratory outcomes included Psychomotor Vigilance Test (PVT; objective performance impairment) and Karolinska Sleepiness Scale (KSS; subjective sleepiness), administered BL and EOT, in the morning after overnight polysomnogram. The 10-minute PVT was completed at 10, 40, and 90 minutes after awakening. The KSS, a single-item, 9-point scale, was completed upon awakening and immediately before/after PVT assessments. Separate nonlinear, mixed-effects regression models were applied to PVT lapses and KSS ratings to estimate objective and subjective sleep inertia magnitudes, respectively, in LSN subgroups, along with sleep inertia dissipation time constants for the overall cohort. Treatment-emergent adverse events (TEAEs) were assessed.

Results: Of 46 enrolled participants with idiopathic hypersomnia, 45 had BL IHSS data; 24 reported LSN and 21 reported no LSN. Most (with/without LSN) were female (100.0%/61.9%) and White (91.7%/76.2%); 20/24 and 19/21 completed the study. Based on PVT lapses, objective sleep inertia ±SE (with/without LSN) at BL was 17.0±4.2/4.2±2.8, and at EOT was 0.0±na/2.0±0.9 (BL-to-EOT changes [95% CI]: -17.0 [-25.5, -8.5] and -2.2 [-6.9, 2.5]). Based on KSS, subjective sleep inertia ±SE (with/without LSN) at BL was 6.5±0.3/5.1±0.5, and at EOT was 0.81±0.5/1.5±0.6 (BL-to-EOT changes [95% CI]: -5.7 [-6.7, -4.7] and -3.5 [-4.5, -2.6]). Sleep inertia dissipation time constants ±SE were 2.7±1.1h (PVT) and 13.9±3.8h (KSS). TEAEs were consistent with the known LXB safety profile.

Conclusion: Participants with idiopathic hypersomnia experienced subjective and objective sleep inertia at BL, with prolonged dissipation after awakening. Objective BL sleep inertia was

particularly severe in participants with LSN (>9h). After LXB treatment, notable improvements in objective and subjective sleep inertia were observed for both subgroups.

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0763

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0764

NIGHTTIME SYMPTOM EXPERIENCE AND TREATMENT CHALLENGES: PERSPECTIVES FROM PEOPLE WITH NARCOLEPSY

Luis Ortiz¹, Maggie Lavender², Anne Morse³, Beth Schneider⁴, Matthew Horsnell⁵, Dan Liss⁶, Shawn Kuczenski⁶, Jennifer Gudeman⁷

¹Johns Hopkins All Children's Hospital, ²Comprehensive Sleep Medicine Associates, ³Geisinger Medical Center, Janet Weis Children's Hospital, ⁴MyHealthTeam, ⁵Project Sleep, ⁶Patient Author, ⁷Avadel Pharmaceuticals

Introduction: Narcolepsy is a chronic sleep disorder characterized by daytime and nighttime symptoms. An anonymous survey was fielded and discussion groups were conducted to identify and describe common symptoms and daytime and nighttime challenges of people with narcolepsy (PWN) and to gain insights among those experienced with once-nightly sodium oxybate (ON-SXB) and oxybate-naïve PWN.

Methods: MyNarcolepsyTeam members from the US were invited to complete a 47-question online survey (9/2022). Respondents selected ≥1 most troubling symptom from a 19-symptom list of patient-friendly terms. Separately, members were invited to participate in 1 of 2 online discussion groups (ON-SXB-experienced [7/2025]; oxybate-naïve [9/2025]). Facilitator-led discussions were conducted using a structured guide.

Results: Of 109 respondents, 97% indicated narcolepsy impacted daily life a "great deal" or "a lot." Symptoms reported as most troubling included excessive daytime sleepiness (90%); nighttime sleep disturbances (81%), including poor quality sleep (67%), disrupted/fragmented sleep (62%), insomnia (40%), or frequent awakenings (40%); vivid dreams (50%); sleep paralysis (31%); hallucinations (26%); and acting out dreams (24%). Most respondents (85%) desired treatments to improve sleep quality; however, only 64% had discussed nighttime treatment options with their clinician. Oxybates were the most frequent clinician-recommended nighttime treatment (69%). Of those currently taking oxybates (n=20), 55% were told they are the best medications for treating daytime and nighttime symptoms by their clinician. Respondents taking oxybates (n=20) were twice as likely to report satisfaction with their treatment regimen than those not taking oxybates (n=76; 70% and 37%, respectively). The separate, small discussion groups (ON-SXB, n=3; oxybate-naïve, n=5) supported nighttime symptom burden experienced by PWN (ie, vivid dreams, sleep paralysis, fragmented sleep). Oxybate-naïve PWN described challenges with daytime alertness following poor nighttime sleep and desired a treatment that would allow them to wake refreshed. Participants in the ON-SXB group desired a treatment that would allow them to sleep through the night and wake refreshed, which was achieved following ON-SXB initiation.

Conclusion: Nighttime symptoms including disrupted sleep, insomnia, and REM-related phenomena are common narcolepsy features. Not taking into account the experiences and needs of PWN throughout the 24-hour cycle, beyond daytime sleepiness, can result in unsatisfactory outcomes for patients.

Support (if any): Avadel Pharmaceuticals

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0765

OXYBATE TREATMENT EXPERIENCE AND PREFERENCES OF PEOPLE WITH IDIOPATHIC HYPERSOMNIA

John Carter¹, Anne Morse², Michael Thorpy³, Bruce Corser⁴, Sally Ibrahim⁵, Maria Picone⁶, Angeni Cordova⁶, Lauren Dougherty⁶, Jacqueline Brooks⁷, Jennifer Gudeman⁷

¹MetroHealth Medical Center, ²Geisinger Medical Center, Janet Weis Children's Hospital, ³Albert Einstein College of Medicine, ⁴Sleep Management Institute, ⁵Case Western Reserve and University Hospitals Cleveland Medical Center, ⁶TREND Community, ⁷Avadel Pharmaceuticals

Introduction: Treatment options for idiopathic hypersomnia (IH) are limited. Oxybate treatment experiences and preferences of people with IH were characterized using survey data.

Methods: Surveys were fielded in 2 phases to respondents recruited from Facebook and Reddit (1/23/2025-3/19/2025) and from Rare Patient Voice members and patients who were provided the link by their clinician (7/28/2025-8/5/2025). Respondents were required to live in the US, be aged ≥18 years, report clinician-diagnosed IH, and be currently/previously receiving an oxybate.

Results: Fifty respondents (female, 96%; age range, 19-66 years) completed the survey. Mean and median time from symptom onset to diagnosis was 10 and 13 years, respectively (range, < 1-37 years). When considering IH treatment, ability to reduce frequency/intensity of excessive daytime sleepiness; improve general health, intellectual functioning, and/or mood; and improve the transition from sleep to wake were rated ≥7 on a 9-point scale (1=not important; 9=extremely important) by 84%, 74%, and 64% of respondents, respectively. Immediate-release (IR) calcium/magnesium/potassium/sodium oxybates was the most common current/previous oxybate taken (84%), followed by IR sodium oxybate (24%); 4% of respondents had previously taken both. IR oxybates were most often prescribed as a twice-nightly regimen (72%); 12% of respondents were prescribed a single IR oxybate dose; 16% were prescribed both single and twice-nightly regimens at some point. Of respondents taking twice-nightly doses, 72% took equal first and second doses (total nightly dose: < 4.5 g, 6%; 4.5-5.9 g, 19%; 6-7.4 g, 8%; 7.5-9 g, 39%), 25% took asymmetric doses, and 1 did not recall their dose. Of 30 respondents (60%) who accidentally missed their second oxybate dose, 47% missed ≥1 dose/week. Consequences of missed doses were extreme sleepiness, brain fog, migraines, and functional impairment. Respondents reported mistimed doses: 36% took their second dose >4 hours and 10% took their second dose < 2.5 hours after the first dose. More than two-thirds of respondents agreed or strongly agreed that a single, premeasured, extended-release bedtime dose of sodium oxybate would be safer/more convenient than current treatment options.

Conclusion: These survey data from people with IH identified delayed diagnoses, challenges with IR oxybates, and a desire for extended-release, once-nightly sodium oxybate.

Support (if any): Avadel Pharmaceuticals

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0766

REAL-WORLD EXPERIENCE OF ONCE-NIGHTLY SODIUM OXYBATE TREATMENT IN PEOPLE WITH NARCOLEPSY: FINAL RESULTS FROM REFRESH

Sarah Meskill¹, Gerard Meskill¹, Asim Roy², Adrian Santamaria³, Robyn Porpiglio⁴, Oktai Mamedov⁵, Sally Ibrahim⁶, Omavi Bailey⁷, Richard Bogan⁸, Laura Herpel⁹, Matthew Davis¹⁰, Jeremy McConnell¹¹, Gretchen Richards¹², Brian Abaluck¹², Jennifer Gudeman¹²

¹Tricoastal Narcolepsy and Sleep Disorder Center, PLLC, ²Ohio Sleep Medicine Institute, ³Northwest Houston Neurology, ⁴Ghaly Sleep Management Services, LLC, ⁵Comprehensive Sleep Center, ⁶Case Western Reserve and University Hospitals Cleveland Medical Center, ⁷Biorhythms, ⁸University of South Carolina School of Medicine, ⁹Bogan Sleep Consultants, ¹⁰Patient First MD, ¹¹Florida Sleep Specialists, ¹²Avadel Pharmaceuticals

Introduction: Oxybate treatment improves quality of life (QOL) for people with narcolepsy; however, the middle-of-the-night dose required with twice-nightly oxybates (TN-OXB) can be burdensome. Once-nightly sodium oxybate (ON-SXB; LUMRYZ™) is approved to treat cataplexy or excessive daytime sleepiness in patients ≥7 years of age with narcolepsy. REFRESH (NCT06792708) is a prospective, real-world study that assessed ON-SXB treatment for narcolepsy.

Methods: Adults with narcolepsy who switched from current TN-OXB (switch participants), or had prior TN-OXB use or were oxybate-naïve (not-oxybate-treated) received ON-SXB titrated in 1.5-g increments weekly or more gradually, based on efficacy/tolerability, up to 9 g/night. At baseline and end of study (EOS), all participants completed a 7-question survey about their QOL and

narcolepsy symptoms. Switch participants completed a baseline survey about their TN-OXB treatment experience. All participants completed an EOS questionnaire about their ON-SXB treatment experience.

Results: In total, 71 participants initiated ON-SXB (switch, n=25 [35%]; prior TN-OXB use, n=10 [14%]; oxybate-naïve, n=36 [51%]). Mean (SD) QOL (0="worst possible," 10="best possible") was 5.9 (1.3) and 5.2 (1.5) at baseline to 7.6 (1.4) and 6.9 (1.4) at EOS for switch (n=20) and not-oxybate-treated (n=34) participants, respectively. Mean (SD) fatigue (0="never fatigued," 10="extremely fatigued") was 6.3 (1.7) and 8.0 (1.6) at baseline to 4.3 (2.3) and 5.1 (2.1) at EOS for switch (n=20) and not-oxybate-treated (n=34) participants, respectively. Most switch participants (92% [23/25]) found the second TN-OXB dose burdensome. At EOS (n=54), narcolepsy was "somewhat" or "much" better with ON-SXB (switch, 70%; not-oxybate-treated, 91%). Participants reported not falling asleep during the day (switch, 55%; not-oxybate-treated, 68%), sleeping through the night (switch, 65%; not-oxybate-treated, 85%), getting more done at work/school (switch, 40%; not-oxybate-treated, 62%), improved socialization (switch, 55%; not-oxybate-treated, 71%), and less drowsy driving among those who had previously experienced drowsy driving (switch, 100% [8/8]; not-oxybate-treated, 90% [19/21]). 75% (15/20) of switch participants preferred ON-SXB to TN-OXB; 10% were not sure or had no opinion. 80% (16/20) of switch participants reported better adherence to once-nightly dosing.

Conclusion: These real-world data demonstrate that ON-SXB treatment improved narcolepsy symptoms and QOL for both switch and not-oxybate-treated patients. The majority of switch participants preferred ON-SXB to TN-OXB.

Support (if any): Avadel Pharmaceuticals

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0767

A CLOCK THAT WON'T STOP: DIAGNOSING NON-24 SLEEP-WAKE DISORDER IN A SIGHTED ADULT WITH SERIAL MELATONIN PROFILING

Saurav Luthra

University of Kansas Medical Center

Introduction: Non-24-hour sleep-wake disorder (N24SWD) is uncommon in sighted individuals and often underdiagnosed due to overlapping features with delayed sleep-wake phase disorder or behavioral sleep irregularity. Objective confirmation using serial melatonin profiling and structured sleep diaries in clinical settings is rarely reported. This case highlights the diagnostic value of combining behavioral and physiologic circadian markers in a sighted adult with a long-standing free-running sleep pattern.

Methods: A 40-year-old sighted male with a >12-year history of progressive sleep-wake delay underwent structured diagnostic evaluation. Data collected included: (1) two-week sleep diary documenting sleep onset/offset patterns, (2) two serial 24-hour salivary melatonin profiles (Salimetrics) performed one week apart, and (3) in-lab polysomnography and home sleep apnea testing. Clinical history, sleep questionnaires, and physical examination findings were integrated with objective circadian markers to establish diagnosis and guide treatment.

Results: Sleep diary revealed a free-running rhythm with approximately one-hour daily delay in both sleep onset and wake time, while total sleep duration (9–10 hours) and sleep quality remained stable. Despite referral for excessive sleepiness, Epworth Sleepiness Scale scores remained 1 across all assessments. Two 24-hour melatonin profiles demonstrated biologically consistent but progressively delayed melatonin secretion. The first profile showed evening rise and nocturnal peak aligned with the patient's delayed habitual sleep time. The second profile, one week later, displayed a further several-hour phase shift that mirrored the drift recorded in the sleep diary. Polysomnography showed mild obstructive sleep apnea (AHI 13–14), which did not account for the circadian pattern. The convergence of clinical history, diary-confirmed phase drift, and shifting melatonin rhythms confirmed a diagnosis of N24SWD in a sighted patient. Therapy was initiated with a melatonin receptor agonist taken 1 hour before a fixed 21:00 bedtime, combined with morning bright-light exposure and behavioral schedule anchoring.

Conclusion: This case highlights that N24SWD can occur in sighted adults and may present with functional impairment rather than subjective sleepiness. Serial melatonin profiling combined with structured sleep-wake documentation can objectively confirm a free-running circadian rhythm and guide targeted entrainment treatment.

Support (if any):

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0768

DRIVING DURING THE BIOLOGICAL NIGHT: DLMO-INDEXED CIRCADIAN PHASE PREDICTS DRIVING PERFORMANCE IN NIGHT SHIFT WORKERSMatthew Jennings¹, Elle Wernette¹, Helen Burgess², Christopher Drake¹, Philip Cheng¹¹Henry Ford Health System, ²University of Michigan

Introduction: Night shift workers (NSWs) face an increased health burden compared to their diurnal counterparts, likely due to misalignment between an individual's endogenous circadian rhythm and external work/real-world demands. This misalignment also negatively impacts performance on complex tasks; importantly, impacting one's driving ability, perhaps beyond fatigue alone. Given the US's heavy reliance on personal transportation over public infrastructure, NSWs face heightened dangers while chronically driving during one's biological night-rest period. The current study examines prospective driving simulator data from NSWs to test whether circadian phase and fatigue impact driving performance.

Methods: NSW participants (N = 74, 51.4% Black, 83.8% female, aged 40.3 ± 12.1yrs) were recruited from Metro Detroit. Measures included: dim light melatonin onset (DLMO) derived via hourly saliva samples; phase angle of driving time relative to DLMO; sleepiness measured by the Karolinska Sleepiness Scale (KSS) at drive time, and driving performance as assessed on the York Driving Simulator using standard deviation of lane position (SDLP) and driving speed variability (Speed SD). The protocol included two 40-min simulated local-area freeway drives (3am, 7am) each during two study visits, totaling 259 drives. Mixed-effects regression models tested associations between circadian phase and fatigue on driving performance, adjusting for demographic characteristics and practice effects.

Results: Median DLMO among NSWs was 11:28 PM (range = 2:38 AM [Day1] – 6:58 PM [Day2]; SD = 7.1hrs). During the 3:00AM and 7:00AM drives, 58.4% and 63.5% of participants, respectively, drove during their biological night. Mixed-effects models revealed a significant quadratic effect of phase angle with both SDLP ($\beta = 0.15$, $p = .006$) and Speed SD ($\beta = 0.16$, $p = .01$), indicating worse driving performance with greater circadian misalignment.

Conclusion: NSWs conduct much of their work during their biological night, when circadian physiology promotes sleep and reduces alertness. Driving performance deteriorated most during the early-morning commute, reflecting the influence of circadian phase. This provides evidence that circadian misalignment can have dire consequences for driving performance.

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0769

HOME-BASED 24-HOUR SALIVARY MELATONIN WAVEFORM PROFILING REVEALS DISTINCT PHYSIOLOGIC PHENOTYPES IN CIRCADIAN RHYTHM DISORDERSY.A.N.A.N. LIU¹, Jacqueline Chang¹, Anjali Ahn¹, Rena C. Schrier¹, Robert Thomas²¹Beth Israel Deaconess Medical Center, Harvard Medical School,²Beth Israel Deaconess Medical Center

Introduction: Optimal assessment of circadian rhythm disorders includes measurement of internal phase biomarkers. Salivary melatonin is commonly used in research but remains an unreimbursed test and thus not integrated into routine clinical practice. Home-based salivary melatonin profiling is feasible yet scarcely used.

Methods: Patients presenting with severe or complex circadian rhythm disorders at the Beth Israel Deaconess Medical Center between 2018 and 2025 were offered salivary melatonin (and in

selected instances cortisol) testing. Testing was done at home; options included a 9 sample dim light onset, a 7 or 9 sample dim light offset, a 9 sample 24-hour phase map, and a combined 9 sample melatonin with simultaneous cortisol. The tests were largely self-pay, directly to the testing service. Detailed instructions were provided, including light/dark control, use of phone applications for lux mapping, and sample timings based on the clinical question. A cold chain was established. Sampling completeness, protocol adherence, internal and behavioral phase-angle metrics, and exploratory phenotype-feature associations were evaluated.

Results: Among 148 patients evaluated, 118 completed saliva sampling, resulting in 145 valid profiles and 1,327 analyzable samples. Participants (mean age 41.9 ± 16.9 years; 58.6% female) demonstrated high sampling completeness (only 1.7% missing data), indicating robust performance of home-based testing in this cohort. Waveforms were categorized into Delayed (61.4%), Advanced (10.3%), Long Biological Night (1.4%), Sustained Hypermelatoninemia (2.1%), Hypomelatoninemia (9.7%), Dysregulated (10.3%), and Normal (4.8%) based on melatonin onset, peak, offset, amplitude, BN duration, and stability. Dysregulated profiles exhibited misalignment with simultaneously measured cortisol. Long biological night cases showed secretion lasting ~20 hours. Dysregulated and Hypermelatoninemia profiles had the longest BN durations and highest waveform instability. Exploratory analyses suggested female predominance in Dysregulated and older age in Long-BN profiles, though not statistically significant.

Conclusion: Home-based salivary melatonin profiling is feasible and reliable, and distinct physiologic waveform clusters, particularly Delayed, Dysregulated, and Long-BN patterns, highlight the diagnostic resolution of waveform-based phenotyping. These data complement behavior-based classification and support broader clinical use of domiciliary melatonin profiling for circadian evaluation and phenotype-guided management.

Support (if any): Institute for Personalized Sleep Health, Beth Israel Deaconess Medical Center

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0770

ASSOCIATIONS BETWEEN BIOLOGICAL CIRCADIAN PHASE, CIRCADIAN ALIGNMENT, AND ACTIGRAPHY-DERIVED REST-ACTIVITY RHYTHMS IN ADOLESCENTS

Eunjin Tracy¹, Nina Oryshkewych², Allysa Quick², Meredith Wallace², Daniel Buysse², Brant Hasler³

¹University of Missouri, ²University of Pittsburgh, ³University of Pittsburgh School of Medicine

Introduction: Adolescence brings biological and psychosocial changes that delay circadian timing and sleep-wake patterns. These delays conflict with early school schedules, contributing to circadian misalignment, short sleep, and daytime impairment. Although both biological and behavioral indices are used to assess circadian functioning, little is known about how biological circadian phase relates to actigraphy-derived rest-activity rhythm (RAR) features in adolescents. This study examined whether biological circadian phase (dim light melatonin onset, DLMO) or circadian alignment (DLMO-midsleep phase angle) were associated with RAR timing, amplitude, and stability. We also explored sex differences in these associations.

Methods: High school students (N=108; 54.6% female; M_age=17.4) completed eight days of actigraphy and two DLMO

assessments (Thursday and Sunday) during the school year. Circadian alignment was defined as the phase angle between Thursday DLMO and actigraphy-based midsleep averaged across the prior three nights. RAR measures included timing indicators (acrophase, tRight, L5 onset), amplitude indicators (log amplitude, relative amplitude), and regularity indicators (interdaily stability, intradaily variability). Multiple regression models tested associations between three predictors—Thursday DLMO, Sunday DLMO, and weekday DLMO-midsleep—and each RAR parameter, controlling for sex. Sex-stratified models evaluated whether associations differed for males and females.

Results: In the full sample, later Thursday and Sunday DLMO were associated with later timing across all RAR timing indicators (β s $\approx .31-.52$, p s $< .001$). Later Sunday DLMO was also associated with lower interdaily stability ($\beta = -.19$, $p = .048$). DLMO-midsleep was not associated with RAR measures overall. In sex-stratified models, however, a larger phase angle predicted earlier acrophase ($\beta = -.28$, $p = .048$) and earlier tRight ($\beta = -.41$, $p = .003$) among males, whereas among females, a larger phase angle was associated with lower relative amplitude ($\beta = -.27$, $p = .04$).

Conclusion: In this adolescent sample, biological circadian phase was most closely reflected by the RAR timing metrics, while a later circadian phase related to less stable activity patterns. Sex-specific associations suggest that circadian alignment manifests differently across sexes—showing earlier declines in daytime activity in males and weaker rhythm robustness in females.

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0771

ASSOCIATION BETWEEN SHIFT WORK ADAPTABILITY AND QUALITY OF LIFE AMONG NIGHT SHIFT WORKERS: THE MODERATING ROLE OF AGE

Yuan Zhang¹, Heidi Lammers-van der Holst², Laura Barger³, Audra Murphy⁴, Jeanne Duffy³

¹University of Massachusetts Lowell, ²Erasmus University Medical Center, ³Brigham and Women's Hospital & Harvard Medical School, ⁴Brigham and Women's Hospital

Introduction: Working at night leads to misalignment between the timing of biological clock and the work/sleep schedule, resulting in shortened and poor sleep. Workers' adaptability to shift work is also frequently linked to their sleep and health outcomes. The objectives of this study were to examine the association between shift work adaptability and quality of life and to explore the moderating role of age in this association among regular night shift workers.

Methods: Night shift workers (n=474, age 39.5 ± 15.1 , 52.7% female) from various occupations who reported working regular night shifts completed an online survey. The survey included questions on socio-demographics, shift work adaptability (flexibility-rigidity & languidness-vigorousness assessed by the Circadian Type Inventory) and quality of life (assessed by the WHO-Quality of Life). Baron and Kenny's Mediating & Moderating Method was used to assess the moderating effect.

Results: Multivariable linear regressions suggested significant associations between shift work adaptability and quality of life among night shift workers, with higher flexibility ($\beta=0.67$, $p<0.001$) and higher rigorousness ($\beta=0.38$, $p<0.001$) linking to better quality of life, after adjusting for age, gender, marital status,

education, shift duration, number of successive shifts, night shift tenure, and childcare responsibility. Age moderated this association, with a stronger relationship between flexibility-rigidity (not languidness-vigorousness) and quality of life in younger (< 50 y) compared to older (≥ 50 y) shift workers ($\beta=0.95$ vs. 0.37 , $p<0.001$). Lower education and having childcare responsibility were associated with poorer quality of life.

Conclusion: Shift work adaptability was positively associated with quality of life in night shift workers, and the association was stronger in younger than older shift workers. One possible explanation is that older workers who have greater difficulty adapting to shift work leave jobs that require shift work. Another possibility is that older shift workers, who are less likely to have childcare responsibilities, have more flexibility and thus can cope better with a shift work schedule. This highlights the importance of circadian type-informed shift scheduling for night shift workers to improve their quality of life, especially for younger workers.

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0772

ASSOCIATIONS BETWEEN SOLAR EXPOSURE AND SLEEP ARCHITECTURE AMONG BLACK ADULTS

Zihao Wang¹, Nina L'Houtellier¹, Daniel Felipe Barba¹, Joon Chung¹, Azizi Seixas², Diana Grigsby³, Michael Grandner⁴, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³Brown University School of Public Health, ⁴University of Arizona

Introduction: Black American adults experience marked sleep disparities situated within a context of unequal psychosocial and environmental burdens. Solar radiation, a major determinant of daytime thermal and light conditions, is an understudied environmental factor that may influence sleep architecture via circadian and thermoregulatory pathways. In this study, we examined the associations between daytime solar radiation and sleep architecture in a cohort of Black American adults.

Methods: We analyzed data from 363 Black American adults (266 females, 97 males; mean age 48.2 ± 14.8 years) from two NIH-funded studies (ESSENTIAL and MOSAIC) conducted in South Florida and New York City. Participants wore SleepImage rings for one week; these devices provided data on sleep states from cardiorespiratory signals, and nightly data were averaged per participant. Percentages of time spent in stable/unstable NREM sleep, and REM sleep were used as sleep architecture outcomes. Daytime solar intensity was indexed by direct-beam sunlight at ground level (W/m^2), estimated from the satellite-based NASA POWER project, linked to residential coordinates by date, and averaged over each participant's monitoring period. Multivariable linear regression, adjusted for age, sex, employment status, marital status, income, and study site, estimated associations between direct sunlight exposure and the percentage of time spent in stable/unstable NREM sleep, and REM sleep.

Results: Greater direct sunlight was linked to more time spent in stable NREM sleep ($\beta=15.2$ percentage points per log-unit, $p=0.004$; adjusted $R^2=0.24$) and less time spent in unstable NREM sleep ($\beta=-10.9$, $p=0.012$; adjusted $R^2=0.20$) and REM sleep ($\beta=-4.3$, $p=0.016$; adjusted $R^2=0.18$), with REM sleep time

decreasing in parallel with unstable NREM sleep. These adjusted models indicate that daytime direct sunlight accounts for a meaningful fraction of between-person differences in sleep architecture.

Conclusion: Among Black American adults, greater daytime direct sunlight exposure was associated with more time spent in stable NREM sleep and less time in unstable NREM and REM sleep, consistent with a more consolidated sleep architecture profile. These patterns support a thermal pathway linking daytime environmental conditions to nocturnal sleep organization and highlight solar exposure as a relevant environmental factor in the context of sleep health disparities.

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0773

INFLUENCE OF CHRONOTYPE AND TIME-OF-DAY ON OBJECTIVE ALERTNESS

Michael Koenig¹, Nathan Nesbitt¹, Emmanuel Mignot², Anne Morse³, Ulysses Magalang¹, Brendan Keenan⁴, Allan Pack⁴

¹The Ohio State University Wexner Medical Center, ²Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ³Geisinger Medical Center, Janet Weis Children's Hospital, ⁴University of Pennsylvania

Introduction: Chronotype describes individual variation in the preferred timing of the sleep-wake cycle and can influence when a person feels most alert. Misalignment between chronotype and timing of assessments of vigilance/alertness may affect performance. We evaluated these relationships using questionnaires and psychomotor vigilance test (PVT) data.

Methods: De-identified data from adults enrolled in the Stanford Technology Analytics and Genomics in Sleep (STAGES) study was obtained from the National Sleep Research Resource. Data included demographics, questionnaires, polysomnography (PSG), sleep diaries, and a 3-minute PVT. The PVT was performed one time per subject either the evening before or morning after the PSG. The time of PVT completion was categorized into intervals of 7-10am ($n=182$), 11am-7pm ($n=366$), or 8-11pm ($n=581$). Chronotype was determined based on responses to the reduced Morningness-Eveningness Questionnaire as evening-type ($n=261$), neither-type ($n=578$), or morning-type ($n=290$). Analysis of covariance was used to compare the number of 355 msec lapses (primary outcome) on PVT among each chronotype based on the time-of-day the PVT was completed, adjusted for age, sex, body mass index (BMI), apnea-hypopnea index (AHI), and sleep duration.

Results: 1129 patients (47% males) were included, with a mean (SD) age of 46.0 (15.1) years, BMI of 31.4 (8.8) kg/m², and AHI of 13.8 (16.4) events/hour. In covariate-adjusted analyses, the number of lapses did not significantly differ based on time-of-day for the total cohort ($p=0.28$). However, when evaluating time-of-day effects separately by chronotype, there were significant differences in PVT performance. Morning-types had more lapses in the evening (8-11pm: 14.69 [12.63, 16.75] lapses) compared to the morning (7-10am: 7.79 [6.37, 9.21] lapses; $p<0.001$). On the other hand, evening-types had more lapses in the morning (7-10am: 16.20 [10.87, 21.57] lapses) compared to the evening (8-11pm: 10.10 [8.77, 11.40] lapses; $p=0.02$). Time-of-day did not significantly impact PVT performance in subjects who were neither-type ($p=0.33$).

Conclusion: Evening-types have more PVT lapses in the morning reflecting their difficulties waking up. Morning-types have more lapses in the evening. These data emphasize the importance of considering the relationship between an individual's chronotype and the time of assessment when interpreting vigilance/alertness as determined by PVT performance.

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0774

METEOROLOGICAL DETERMINANTS OF SLEEP ARCHITECTURE

Matthew Betancourt¹, Zihao Wang¹, Carolina Scaramutti², Brittany Larsen², Nikole Montesinos¹, Clarence Earl Locklear¹, Denise Christina Vidot¹, Azizi Seixas², Judite Blanc¹, Michael Grandner³, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³University of Arizona

Introduction: Meteorological phenomena such as temperature, humidity, and cloud cover can influence sleep architecture. Environmental factors can impact circadian rhythm, sleep continuity, and overall sleep quality. However, research examining this relationship is limited, especially among Black adults. Those relationships are important for individuals who live in urban areas such as New York City (NYC) and South Florida, where heat exposure, humidity, and other meteorological conditions may support or disrupt healthy sleep duration and sleep schedules. This study examines the meteorological determinants relating to sleep architecture among Black adults living in NYC and South Florida.

Methods: The dataset comprised 363 participants (mean age 48.2 ± 14.8 years; 73.3% female) who completed demographic surveys and provided self-reported location data. Meteorological exposures were derived by linking self-reported location with NASA POWER datasets. Participants wore the Sleep Image Ring for one week to assess sleep architecture, including the percentage of time spent in REM sleep and stable/unstable NREM sleep. Four meteorological variables were evaluated: mean temperature, mean humidity, mean precipitation, and mean cloud cover. Covariates included age, sex, employment status, marital status, income, and location. Data were harmonized between the two studies before conducting planned analyses. Data visualization and analysis were conducted using R Studio (version 2025.09.2+418.pro4).

Results: Four statistically significant associations were identified. Each 1-unit increase in total precipitation was associated with a 0.20-percentage-point increase in REM sleep percent ($\beta = 0.204$, SE = 0.078, $p = 0.009$). Greater cloud cover was associated with higher REM sleep percentage ($\beta = 0.038$, SE = 0.017, $p = 0.029$) and lower stable NREM sleep percentage ($\beta = -0.112$, SE = 0.051, $p = 0.031$). Higher relative humidity was associated with a greater percentage of unstable NREM percent ($\beta = 0.344$, SE = 0.166, $p = 0.039$). No significant associations were observed for temperature.

Conclusion: Cloud cover, humidity, and precipitation were identified as being meteorological determinants of sleep architecture. Environmental exposure can influence sleep architecture among Black Adults and highlights the need for further research considering the critical role of the meteorological context within which sleep-health research is conducted.

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0775

SLEEP TIMING IN CHILDREN AND ADOLESCENTS WITH FUNCTIONAL ABDOMINAL PAIN DISORDERS

Neha Santucci¹, Cassandra Goldfarb¹, Dean Beebe², Priyanshi Shah¹, Rashmi Sahay¹, Christopher King¹

¹Cincinnati Children's Hospital Medical Center, ²University of Cincinnati College of Medicine

Introduction: Functional abdominal pain disorders (FAPD) are among the most common chronic pain conditions in childhood, affecting 25% of children worldwide and accounting for about 50% of pediatric gastroenterology visits. Self-reported sleep disturbances with impaired functioning have been reported in FAPD patients, however, objective sleep measures, specifically circadian rhythm disruptions, are scarce. Hence, we aimed to objectively characterize the sleep quality, duration, and timing of children with FAPD compared to healthy controls.

Methods: Patients who met the criteria for FAPD through the Rome 4 diagnostic questionnaire were recruited throughout the year from the Disorders of Gut Brain Interaction (DGBI) Clinic at CCHMC. Healthy controls aged 11-18 years, matched in demographic variables (BMI, race, gender) with cases, were recruited in a 1:1 ratio. Demographic information, medications (including timing), dietary patterns, school schedule, validated questionnaires (ASWS: Adolescents Sleep-Wake Scale, PISI: Pediatric Insomnia Severity Index) and other medical comorbidities were collected in cases and controls. Subjects were sent home with an actiwatch (Philips Respironics) to complete actigraphy assessments for 7 days.

Results: Youth with FAPD ($n = 26$) subjectively reported significantly poorer sleep quality and insomnia severity than controls ($n = 28$) on questionnaires ($p < .0001$). However, we did not observe statistically significant differences in sleep duration or sleep efficiency on actigraphy ($p > .05$). Compared to controls, youth with FAPD had notably delayed sleep timing on actigraphy, measured by the sleep midpoint (198.44 ± 50.1 vs 237.00 ± 75.0, $d = .61$, $p = .039$). When using sleep midpoint to group into morning, intermediate, or evening chronotype, youth with FAPD disproportionately showed an evening (night owl) chronotype ($\phi = .40$; $d = .87$; $p = .033$).

Conclusion: Objective actigraphy suggests that youth with FAPD experience delayed sleep timing, disrupted circadian rest-activity rhythms compared to pain-free peers. As youth with late circadian phase can have their sleep truncated by environmental demands (e.g., early school start), and since there are effective phase-shifting interventions, these findings may open new doors for intervention.

Support (if any):

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0776

ALTERED SALIENCE NETWORK CONNECTIVITY TO SLEEP-RELATED SOUND MODERATES THE INSOMNIA-DEPRESSION ASSOCIATION IN ROTATING SHIFT WORKERS

Jiyoung Shin¹, Kyung Hwa Lee², Ha Young Lee², Jeong Eun Jeon², Jin Hyuk Yoo², Cho Won Park³, Minah Kim², Mincheol Seo⁴, Sehyun Jeon⁵, Sun-Young Kim⁶, Seog Ju Kim⁷, Yu Jin Lee²

¹SMG-SNU Boramae Medical Center, ²Seoul National University Hospital, ³Seoul National University College of Medicine, ⁴Uijeongbu Eulji Medical Center, ⁵Sungkyunkwan University College of Medicine, ⁶Ewha Womans University College of Medicine, ⁷Samsung Medical Center

Introduction: Misalignment between circadian and social rhythms in shift workers (SW) is associated with sleep and psychiatric problems. Altered brain response to sleep-related sounds (SS) may reflect increased sleep disruption. We examined neural responses to SS in SW versus healthy controls (CON) and tested whether SS-related brain activity moderates the relationship between mood symptoms, insomnia severity, and 24-hour rest-activity rhythm (RAR).

Methods: SW (n = 57; 75.4% female) and CON participants (n = 56; 71.4% female) completed self-report questionnaires, including the Insomnia Severity Index (ISI), Beck Depression Inventory (BDI), and Beck Anxiety Inventory. All participants underwent overnight polysomnography and a week of actigraphy accompanied by daily sleep diaries. 24-hour RAR were derived using cosinor analysis. During functional MRI, participants listened to SS and control sounds (CS). Brain activation to SS (vs. CS) were compared between groups. A moderation analysis was performed using ISI as the outcome variable and BDI, BAI, and 24-hour RAR as predictors, including brain regions showing group differences as moderators.

Results: SW presented higher ISI (W = 1985, p = 0.025) and BDI scores (W = 1915, p = 0.043), and lower interdaily stability, relative amplitude, and higher least active 5-hour period (all-ps < 0.001). SW had greater functional connectivity (FC) between the left anterior insula and supramarginal gyrus extending to middle frontal gyrus during sleep-related sound (vs. control sound) compared to CON (t = 4.76, p < 0.001). In addition, FC between right supramarginal gyrus (SMG) and subcallosal cortex extending to frontal medial cortex and frontal orbital cortex were lower in SW compared to CON (t = -4.96, p < 0.001). In SW, BDI score was more strongly associated with ISI when AI-SMG FC was higher than when AI-SMG FC was lower, while hearing SS (vs. CS).

Conclusion: Our results suggested differential brain activity to sleep-related stimuli in SW. Moreover, the findings indicate that increased right AI-SMG FC in SW can be associated with increased impact of depression on insomnia severity. Therefore, AI-SMG connectivity may represent a potential target for managing mood problems and sleep disturbances in shift workers.

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0777

ASSOCIATION OF CHRONOTYPE WITH THE GENE EXPRESSION OF SLC2A3 AND SLC2A5: RELATIONSHIPS WITH ENERGY METABOLISM AND RISK OF INSULIN RESISTANCE

Priscila Tempaku¹, Bruna Ribeiro², Sergio Tufik²

¹Instituto do Sono, Associação Fundo de Incentivo à Pesquisa,

²Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: The circadian rhythm, which follows an approximately 24-hour cycle, plays a fundamental role in glucose metabolism and the regulation of insulin sensitivity. It is known that the human circadian rhythm presents phenotypically as

three chronotypes: morning, evening, and intermediate. This circadian preference distinguishes individuals who become more active early in the day—sleeping and waking earlier—from those who sleep, wake, and reach peak performance later. When the sleep-wake pattern deviates from an individual's circadian preference, metabolic alterations such as decreased insulin sensitivity may be observed. Furthermore, sleep disorders are known to affect the expression of genes involved in energy metabolism, such as SLC2A3 and SLC2A5. In this sense, this study aimed to investigate the association between circadian preference, sleep patterns, and the gene expression of SLC2A3 and SLC2A5.

Methods: A prospective cross-sectional assessment was conducted with participants aged 30 to 40 years, who underwent blood collection at a standardized time for measurement of these genetic markers and completed questionnaires assessing sleep and circadian preference.

Results: Results indicated that the evening chronotype was associated with a higher frequency of insulin resistance ($\chi^2 = 16.343$; df = 8; p = 0.038), higher fasting insulin levels ($\beta = 2.127$; CI95% = 0.182 – 4.070, p = 0.032), poorer subjective sleep quality ($\chi^2 = 9.563$, df = 3; p = 0.042), and greater severity of insomnia symptoms ($\beta = 0.257$; CI95% = 0.053 – 0.462, p = 0.013). Expression of SLC2A5 correlated negatively with insulin ($\rho = -0.489$; p = 0.039) and HOMA-IR ($\rho = -0.478$; p = 0.045), suggesting a protective effect against insulin resistance. We also found that the association between chronotype and fasting insulin levels was significantly mediated by SLC2A5 expression ($\beta = -2.684$; 95% CI = -5.112 to -0.255; p = 0.030).

Conclusion: In conclusion, the evening chronotype was associated with worse metabolic and sleep outcomes, indicating a risk profile that may be related to the expression of genes involved in energy metabolism.

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0778

MANAGEMENT OF SHIFT WORK DISORDER AN AMERICAN ACADEMY OF SLEEP MEDICINE CLINICAL PRACTICE GUIDELINE

Kenneth Wright¹, Sabra Abbott², Liza Ashbrook², Christopher Drake³, Erin Flynn-Evans⁴, Sarah Frammes-Deboer², Uzma Kazmi², Kelly Keeler², Catherine McCall⁵, Rebecca Morgan², Taylor Shaffer-Hodgeman², Lynn Trotti⁶

¹University of Colorado, ²Formerly with AASM, ³Henry Ford Health System, ⁴NASA Ames Research Center, ⁵University of Washington, ⁶Emory University

Introduction: This guideline establishes recommendations for the treatment of shift work disorder (SWD).

Methods: The American Academy of Sleep Medicine (AASM) commissioned a task force of experts in sleep and circadian medicine to develop recommendations and assign strengths based on a systematic review of the literature and an assessment of the evidence using the GRADE process. The task force summarized the relevant literature and the quality of evidence, the balance of benefits and harms, patient values and preferences, and resource use considerations supporting the recommendations. The AASM Board of Directors approved the final recommendations.

Results: The following recommendations are intended as a guide for clinicians in choosing specific treatment(s) for symptoms of

excessive sleepiness and/or insomnia, and for circadian adaptation in adults with SWD. Each recommendation statement is assigned a strength (e.g., “Strong” or “Conditional”). For SWD, there were only “conditional” recommendations for or against (i.e., “We suggest...”) and those requiring the clinician to use clinical knowledge and experience and consider the individual patient’s values and preferences to determine the best course of action. Interventions in recommendation statements were compared to no treatment.

Conclusion: Adults with SWD with symptoms of excessive sleepiness associated with work schedule: 1. In adults with SWD with excessive sleepiness, the AASM suggests the use of armodafinil or modafinil taken 30 to 60 minutes prior to the night shift over no armodafinil or modafinil (Conditional recommendation, moderate certainty evidence). 2. In adults with SWD with excessive sleepiness, the AASM suggests the use of bright light over no bright light during the night shift (Conditional recommendation, very low certainty evidence). Remark: Individuals with SWD who exhibit insomnia and daytime function impairments may also benefit from using bright light during their night shift. 3. In adults with SWD with excessive sleepiness, the AASM suggests the use of caffeine taken prior to and/or during the night shift over no caffeine (Conditional recommendation, very low certainty evidence). Remark: Caffeine intake close to bedtime can disrupt sleep onset and quality, which may exacerbate symptoms of shift work disorder. 4. In adults with SWD with excessive sleepiness, the AASM suggests the use of a clockwise rotating shift schedule over a counterclockwise rotating shift schedule (Conditional recommendation, very low certainty evidence). 5. In adults with SWD with excessive sleepiness, the AASM suggests taking a nap over no nap prior to the night shift (Conditional recommendation, very low certainty evidence). Remarks: Sleep inertia occurring soon after the nap may temporarily increase sleepiness, decrease cognitive performance, and increase accident risk. Allowing adequate time for resolution of sleep inertia prior to driving or performing other safety-sensitive behaviors may be needed to reduce these risks. 6. In adults with SWD with excessive sleepiness, the AASM suggests either not eating or eating a snack rather than eating a full meal during the night shift (Conditional recommendation, low certainty evidence). 7. In adults with SWD with excessive sleepiness, the AASM suggests the combination of caffeine and bright light over the combination of no caffeine and no bright light (Conditional recommendation, very low certainty evidence). Remark: Caffeine intake close to bedtime can disrupt sleep onset and quality, which may exacerbate symptoms of shift work disorder. 8. In adults with SWD with excessive sleepiness, the AASM suggests the combination of taking a nap and caffeine over the combination of no nap and no caffeine prior to the night shift (Conditional recommendation, very low certainty evidence). 9. In adults with SWD who are working either an 8-hour or 12-hour night shift, the AASM does not suggest working one shift duration over the other (Conditional recommendation, very low certainty evidence). Remark: This recommendation does not consider other shift durations, rotation, or the number of consecutive shifts. This guideline did not look at shifts over 12 hours. The total number of hours worked per week ranged from 36 to 52. Adults with SWD with sleep disturbance/insomnia: 10.9. In adults with SWD with daytime sleep disturbance/insomnia the AASM suggests the use of CBT-I over no CBT-I (Conditional recommendation, very low certainty evidence). 11.10. In adults with SWD with daytime sleep disturbance/insomnia following the night shift, the AASM suggests the use of melatonin over no melatonin (Conditional

recommendation, very low certainty evidence). 12.11. In adults with SWD with sleep disturbance/insomnia, when transitioning from daytime to nighttime sleep, the AASM suggests the use of melatonin over no melatonin for night sleep following shift work (Conditional recommendation, low certainty evidence). 13.12. In adults with SWD who desire to take a nap prior to the first night shift, the AASM suggests the use of melatonin over no melatonin prior to the nap (Conditional recommendation, very low certainty evidence). Remarks: Melatonin may temporarily increase sleepiness, decrease cognitive performance, and increase accident risk. Allowing adequate time for resolution of sleepiness prior to driving, returning to work or performing other safety-sensitive behaviors may be needed to reduce these risks. 14.13. In adults with SWD with daytime sleep disturbance/insomnia, the AASM suggests the use of ramelteon or other melatonin receptor agonists over no melatonin receptor agonist (Conditional recommendation, low certainty evidence). 15.14. In adults with SWD with daytime sleep disturbance/insomnia, the AASM suggests the use of suvorexant or other dual orexin receptor antagonists over no dual orexin receptor antagonists (Conditional recommendation, low certainty evidence). 16.15. In adults with SWD with daytime sleep disturbance/insomnia, the AASM suggests against the use of triazolam and other benzodiazepines (conditional recommendation, very low certainty evidence). Adults with SWD seeking circadian adaptation 17.16. In adults with SWD seeking circadian adaptation to the night shift, the AASM suggests the use of bright light over no bright light during the night shift (Conditional recommendation, very low certainty). Remarks: For individuals who work rotating or frequently changing shifts, circadian adaptation is not a realistic goal of treatment and therefore they would not be expected to benefit from this intervention. The evidence supporting this recommendation came from studies in which individuals reached partial circadian adaptation to the night shift. 18.17. In adults with SWD seeking circadian adaptation to the night shift, the AASM suggests the combination of bright light at night and fixed daytime sleep timing over the combination of no bright light and no fixed sleep timing (Conditional recommendation, very low certainty evidence). Remarks: For individuals who work rotating or frequently changing shifts, circadian adaptation is not a realistic goal of treatment and therefore they would not be expected to benefit from this intervention. The evidence supporting this recommendation came from studies in which individuals reached partial circadian adaptation to the night shift. 19.18. In adults with SWD seeking circadian adaptation to the night shift, the AASM suggests the combination of bright light at night, fixed daytime sleep timing, and reduced-light-transmittance glasses in the morning over the combination of no bright light, no fixed sleep timing, and no reduced-light-transmittance glasses (Conditional recommendation, very low certainty evidence). Remark 1s : For individuals who work rotating or frequently changing shifts, circadian adaptation is not a realistic goal of treatment and therefore they would not be expected to benefit from this intervention. The evidence supporting this recommendation came from studies in which individuals reached partial circadian adaptation to the night shift. Remark 2: Attention to driving safety is important when wearing reduced-light-transmittance glasses Other considerations for Adults with SWD 19. In adults with SWD who are working either an 8-hour or 12-hour night shift, the AASM does not suggest working one shift duration over the other (Conditional recommendation, very low certainty evidence). Remark: This recommendation does not consider other shift durations, rotation, or the number of consecutive shifts. This guideline did not look

at shift durations exceeding 12 hours. The total number of hours worked per week ranged from 36 to 52.

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0779

24-HOUR REST-ACTIVITY RHYTHM AND ALZHEIMER'S DISEASE BIOMARKERS IN ADULTS WITH DOWN SYNDROME

Paul Chung¹, Victoria Fleming-Batayneh², Kathryn Reid¹, Daniela Grimaldi¹, David Plante³, Christy Hom⁴, Beau Ances⁵, Benjamin Handen⁶, Bradley Christian², Elizabeth Head⁷, Mark Mapstone⁴, Sigan Hartley², Phyllis Zee⁸

¹Northwestern University, ²Waisman Center, ³Department of Psychiatry, University of Wisconsin, Madison, ⁴University of California, ⁵Washington University School of Medicine in St. Louis, ⁶University of Pittsburgh, ⁷University of California Irvine School of Medicine, ⁸Northwestern University Feinberg School of Medicine

Introduction: Little is known about circadian rhythm disruption and Alzheimer's disease (AD) biomarkers in adults with Down syndrome (DS). The study aim was to examine the association of 24-hour rest-activity rhythm (RAR) with plasma Amyloid-Tau-Neurodegeneration (ATN) biomarkers and amyloid PET in adults with DS.

Methods: Cross-sectional study of adults with DS (25–61 years) enrolled in the Alzheimer Biomarker Consortium-Down syndrome who underwent wrist-worn actigraphy, plasma ATN and amyloid PET assessment. Primary variables were measures of 24-hour RAR: interdaily stability (IS), intradaily variability (IV), relative amplitude (RA), L5 (least active 5-hour period) and M10 (most active 10-hour period). Secondary measures included: coefficient of variation of total sleep time, sleep midpoint, and sleep efficiency; and the sleep regularity index (SRI). ATN biomarkers included amyloid beta 42/40 ratio, phosphorylated-tau 181 (pTau181), and neurofilament light chain. Amyloid PET were harmonized using centiloids. Analyses were performed using linear regressions. Covariates included age, sex, intellectual disability level, site, and obstructive sleep apnea severity.

Results: Of 91 participants, mean (SD) age was 39.5 (8.6) years and 43% were female. After adjustment, higher IV (indicating fragmentation of RAR in a 24-hour period) was associated with increased levels of pTau181 [standardized beta (β)=0.22, $p=0.02$]. Higher RA (indicating robust RAR) and higher SRI (indicating consistent and regular sleep patterns) were associated with lower pTau181 ($\beta = -0.21$, $p=0.03$ and $\beta = -0.21$, $p=0.03$, respectively). In the subsample of participants who had amyloid PET data available at the time of analysis ($n = 50$), higher IV was associated with increased centiloids ($\beta=0.22$, $p=0.04$).

Conclusion: These findings suggest that circadian rhythm disruption (RAR) is associated with plasma and imaging biomarkers of AD. Further research is needed to understand whether interventions to strengthen circadian rhythms reduce AD biomarker burden.

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0780

JET LAG ASSOCIATED WITH EASTWARD TRAVEL AND ITS TREATMENT WITH ARIPIPRAZOLE

Takashi Kanbayashi¹, Shigeru Chiba², Emiko Campbell Anegawa³, Yuki Omori⁴, Yoko Irukayama⁵, Mayumi Kimura⁶, Emi Iwabuchi⁷, Kentaro Shirai⁸, Taisuke Ono⁹, Hikari Yashiki¹, Park Insung¹⁰, Akiyoshi Shimura¹¹

¹International Institute for Integrative Sleep Medicine (WPI-IIMS), Tsukuba Institute for Advanced Research (TIAR), University of Tsukuba, ²Ibaraki Prefectural Medical Center of Psychiatry, ³Tsukuba White Dental Clinic, ⁴Department of Psychiatry, Tokyo Metropolitan Institute of Gerontology, ⁵Medical Mycology Research Center, Chiba University, ⁶International Research Center for Neurointelligence, International Institutes for Advanced Study, The University of Tokyo (WPI-IRC), ⁷Ibaraki Prefectural Children's Hospital, ⁸Department of Pediatrics, Tsuchiura Kyodo General Hospital, ⁹Department of Geriatric Medicine, Kanazawa Medical University, ¹⁰Hiroshima University, ¹¹Department of Sleep Medicine, Tokyo Medical University

Introduction: When experiencing jet-lag, 7-8-hour travels eastward can often feel overwhelming. For example, flights from Japan to San Francisco (SFO) departs Japan at 5:00PM and arrives at SFO nine hours later at 10:00AM local time. However, the body's rhythm at this time is 2:00AM. Being woken up in the middle of the night leaves the individual feeling drowsy. Even if you fall asleep after dinner, you may sleep for a few hours only to wake up in the middle of the night. This often results in being unable to fall asleep until morning. Aripiprazole, a partial dopamine agonist, has been shown to promote early awakening in humans (Omori, 2018). In a jet-lag experiment in mice in which mice were given a six-hour early riser, it took approximately one week for those without the medication to adapt to the time difference, while those receiving oral APR adapted in 2-3 days (Li, 2023). This study was conducted to examine the effectiveness of APR for treating jet-lag in humans.

Methods: We investigated whether oral administration of Aripiprazole, initiated the day before or the morning of departure, would facilitate adjustment to local time settings. Nine subjects were medical professionals or sleep researchers, and after an explanation of the study, informed consent was obtained. This study was approved by the ethics committee. Individuals were free to choose whether or not to take the medication; six chose the Aripiprazole group and four chose the control group (one subject participated in both groups). Dosages were determined based on body weight: 0.5mg (< 60kg) or 1mg (>60kg). Subjects continued taking the medication for several days after travel until they adjusted to the jet lag and were asked to complete a sleep diary.

Results: All subjects in the medication group reported experiencing less severe jet-lag than during previous travel. Sleep diaries confirmed that administration resulted in slightly longer sleeping time (6h vs 6.6h, ns) and fewer awakenings time during the night (1.6h vs 0.4h, $p < 0.05$) in initial four nights. No adverse events were observed due to the low dose of 0.5-1mg.

Conclusion: Low-dose Aripiprazole appears to be beneficial in reducing 7-8 hours of jet-lag during eastbound travel.

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0781

COMPARATIVE RESPONSE TO TONIC MOTOR ACTIVATION (TOMAC) AND EXTENDED-DURATION TOMAC FOR RESTLESS LEGS SYNDROME (RLS)

Hussein Alawieh, Leticia Camacho, Jatin Tekchandani,
Jonathan Charlesworth
Noctrix Health, Inc.

Introduction: Restless legs syndrome (RLS) is often associated with breakthrough symptoms during sleep causing increased wake after sleep onset. High-frequency peroneal nerve stimulation – also known as tonic motor activation (TOMAC) – reduces RLS symptoms and improves sleep when administered for 30-minutes as needed (TOMAC-30). Here, we evaluated comparative response to an investigational device that stimulates for an extended duration of 180-minutes every night (TOMAC-180).

Methods: This open-label trial enrolled patients with moderate-to-severe RLS (IRLS ≥ 15) who reported ≥ 3 nights per week of mid-night awakenings with symptoms. Patients were assigned to TOMAC-30 for two weeks followed by six weeks of TOMAC-180. For TOMAC-30, patients activated 30-minute sessions as needed at bedtime or after mid-night awakenings. For TOMAC-180, patients activated one 180-minute session every night. Outcome measures were evaluated at week-8 relative to study entry and were International RLS Study Group Rating Scale (IRLS) score, Medical Outcomes Study Sleep Problems Index II (MOS-II), and Patient Global Impressions of Improvement (PGI-I) responder rate. All week-8 outcomes for participants in the present study ($n=14$) were compared to week-8 outcomes for participants who were assigned to TOMAC-30 (not sham) in the previously published RESTFUL study ($n=64$).

Results: Mean IRLS change for TOMAC-180 was -11.4 points (CI: $-15.4, -7.3$) versus -8.7 for TOMAC-30 in RESTFUL (CI: $-10.2, -7.1$), a difference of -2.7 (CI: $-7.0, 1.6$). The prevalence of ≥ 10 point IRLS reduction was 71.4% for TOMAC-180 versus 35.9% for TOMAC-30 in RESTFUL. Mean MOS-II change was -30.7 points (CI: $-42.0, -19.3$) for TOMAC-180 versus -18.2 for TOMAC-30 in RESTFUL (CI: $-21.8, -14.5$), a difference of -12.5 (CI: $-24.3, -0.8$). PGI-I responder rate was 78.6% for TOMAC-180 and 60.9% for TOMAC-30 in RESTFUL. No device-related serious or severe adverse events were observed, and no patients discontinued TOMAC-180 due to adverse events or lack of tolerability.

Conclusion: Extending the duration of TOMAC stimulation during sleep from 30 to 180 minutes was well tolerated and may lead to greater improvements in RLS symptoms and sleep, especially for patients with frequent awakenings. Further research with a larger sample size and randomized control group is warranted.

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0782

DIVING INTO THE ENIGMA OF REM AND NREM-RELATED PERIODIC LIMB MOVEMENTS OF SLEEP: CLINICAL AND POLYSOMNOGRAPHIC PREDICTORS

Bhavyata Vaddavalli, Lourdes DelRosso
University of California San Francisco Fresno

Introduction: Periodic limb movements of sleep (PLMS) are repetitive nocturnal leg movements typically occurring during non-rapid eye movement (NREM) sleep, though a subset of patients also display movements during rapid eye movement (REM) sleep. The physiological and clinical correlates of REM-related PLMS remain poorly understood. This objective of this study was to characterize the prevalence and predictors of PLMS during REM and NREM sleep in a clinically referred adult population undergoing polysomnography (PSG).

Methods: We conducted a cross-sectional analysis of 198 adults referred for diagnostic PSG. Demographic, clinical, and PSG data were extracted, and ridge-regression models identified predictors of PLMS separately for NREM and REM stages, adjusting for age, sex, comorbidities, and medication use.

Results: A total of 192 adults were analyzed for REM outcomes. The cohort included 47.4% men and 52.6% women. Hypertension was the most prevalent comorbidity (54.7%), followed by diabetes (24.0%) and hypothyroidism (17.7%). Elevated PLMS (PLMI > 15) occurred in 19.5% of patients exclusively during NREM only, 7.8% during REM only, and 33.7% in both stages. In the NREM model, older age ($\beta = 0.047, p < 0.001$) and male sex ($\beta = 1.463, p = 0.020$) predicted greater PLMS, whereas longer NREM duration was protective ($\beta = -0.014, p = 0.008$). In contrast, REM PLMS were inversely associated with hypothyroidism ($\beta = -4.170, p < 0.001$) and positively with N1 sleep percentage ($\beta = 0.368, p = 0.024$). Other morbidities and medication use were not significant.

Conclusion: Predictors of PLMS vary based on sleep stage. NREM PLMS are influenced by age and sex, while REM PLMS appear to be driven by sleep-stage dynamics and thyroid status. These findings suggest that REM-related PLMS may represent a distinct physiological phenotype, highlighting the need for further studies on their pathophysiological and clinical significance.

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0783

GENOME-WIDE ASSOCIATION STUDY OF RESTLESS LEGS SYNDROME IN CHINESE IDENTIFIES NOVEL LOCI AND ENHANCES CROSS-POPULATION RISK PREDICTION

Wenjun Zhu¹, Chen Zhao², Xiaosong Dong¹, Liyue Xu¹, Chenyu Li³,
Mingming Zhao⁴, Peijun Xue⁵, Juliane Winkelmann², Fang Han¹

¹Peking University People's Hospital, ²Technical University of Munich, TUM, ³Chongqing Municipal Hospital of Traditional Chinese Medicine, ⁴Department of Sleep Medicine, People's Hospital of Guangxi Zhuang, ⁵Peking University People's Hospital

Introduction: Restless legs syndrome (RLS) displays distinct clinical and genetic characteristics in East Asians, yet large-scale genomic data from China remain limited. To address this gap, we conducted the largest multicenter genome-wide association study of RLS in the Chinese population to define population-specific genetic architecture and phenotype-genotype relationships.

Methods: This multicenter study was led by Peking University People's Hospital and included RLS patients from 25 accredited sleep laboratories across 16 provinces in China through the national RLS research network (RLSNC). Genome-wide association analyses, functional annotation, phenotype-wide association screening, genotype-phenotype stratification, and logistic

regression models were performed to evaluate genetic effects on PLMI severity, sleep efficiency, and other RLS-relevant traits.

Results: We performed the largest multicenter GWAS of RLS in China, including 1,584 primary cases and 6,921 matched controls recruited from 25 sleep laboratories across 16 provinces. We identified six genome-wide significant susceptibility loci in the Chinese population, comprising three loci overlapping with signals previously reported in European-ancestry cohorts and three novel Chinese-specific loci—including variants near NTNG1 and additional signals in regulatory regions involved in synaptic function and neuronal excitability—and replicated BTBD9 and GLO1, whereas MEIS1 did not reach genome-wide significance, indicating marked trans-ethnic heterogeneity. NTNG1 (rs4603157) was strongly associated with sleep efficiency, showing a progressive genotype shift from normal to poor and severe categories. BTBD9 (rs3923809) showed a robust association with lower PLMI, with the G allele acting as a protective variant (OR = 0.59). Phenotype-genotype heatmaps revealed two major clusters—PLMI/fatigue (BTBD9/NCOA4) and sleep efficiency (NTNG1)—supporting genetically separable subtypes. These findings define the first high-resolution Chinese RLS genetic map and inform cross-population interpretation and subtype-based risk prediction.

Conclusion: This large multicenter Chinese GWAS identifies population-specific RLS susceptibility loci and reveals distinct genetic pathways underlying PLMI-dominant and sleep-fragmentation-dominant subtypes. These results refine trans-ethnic interpretation of RLS genetics and provide a foundation for subtype-based precision risk stratification in East Asians.

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0784

LONGITUDINAL OUTCOMES AND PREDICTORS OF PHENOCONVERSION IN THE MAYO CLINIC ISOLATED REM SLEEP BEHAVIOR DISORDER REGISTRY

Alan Li, Ellery Tripp, Diana Issa, Olivia Cesarone, Thomas Finstuen, Jack Jagielski, Bradley Boeve, Mithri Junna, Melissa Lipford, Maja Tippmann-Peikert, Diego Carvalho, Michael Silber, Stuart McCarter, Erik St. Louis
Mayo Clinic, Rochester

Introduction: Isolated REM sleep behavior disorder (iRBD) is characterized by loss of normal REM sleep atonia and dream enactment behavior. iRBD is strongly associated with α -synucleinopathies and risk for developing Parkinson's disease (PD), dementia with Lewy bodies (DLB), and multiple system atrophy (MSA), yet phenoconversion risk for long-term outcomes of younger women and men remains undefined. We aimed to ascertain longitudinal outcomes and phenoconversion risk in the Mayo Clinic iRBD cohort.

Methods: Eighty-nine of 165 registry participants with at least one-year follow-up were included. Retrospective chart review attained baseline demographics, age at presentation, baseline Timed Up and Go (TUG) and Montreal Cognitive Assessment (MoCA) scores, and phenoconversion status (iRBD, PD, DLB, mild cognitive impairment [MCI], MSA, or other). Kaplan-Meier survival

analysis and Cox proportional hazards modeling were analyzed with alpha at $p < 0.05$.

Results: 68 men and 21 women had a mean age of 63 years at polysomnographic diagnosis. At follow-up, 64 (71.9%) remained iRBD; 7 (7.9%) developed PD, 11 (12.4%) developed DLB, 3 (3.4%) developed MCI, 1 (1.1%) developed MSA, and 3 (3.4%) developed another dementia. Abnormal TUG (>12 seconds) occurred in 5.9% and abnormal MoCA (< 24) in 23.3%. Phenoconversion rates were similar in women and men ($p = 0.44$). Older age at PSG predicted phenoconversion, corresponding to a two-fold increase in risk with each 10-year increase (HR 2.00, 95% CI 1.15–3.52). Neither abnormal TUG nor MoCA predicted conversion. Cumulative phenoconversion was approximately 1% at 1 year, 7% at 3 years, 10% at 5 years, 30% at 10 years, 34% at 12 years, and 49% at 15 years. Mean and median time to phenoconversion was 7 years (range, 1–18 years).

Conclusion: We found that iRBD phenoconversion rates were lower than historically reported. Only age at presentation predicted phenoconversion, with risk doubling per decade. At 12 years, cumulative phenoconversion rate was approximately 34%.

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0785

VALIDATION OF A TWO-STAGE QUESTIONNAIRE AND ACTIGRAPHY SCREENING FOR ISOLATED REM SLEEP BEHAVIOR DISORDER IN A MULTICENTER CASE-CONTROL COHORT

Caleb Massimi¹, Giorgio Ricciardiello Mejia¹, Andre Metzger¹, Kang Hyun Ryu¹, Eva Grzegorzczuk¹, Boris Gilyadov¹, Eliana Jacobs¹, Claudia Kunney¹, Ankit Parekh¹, Emmanuel Mignot², Fanny Elahi¹, Joseph Winer³, Kathleen Poston³, Andreas Brink-Kjær⁴, Emmanuel During¹

¹Icahn School of Medicine at Mount Sinai, ²Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ³Stanford University, ⁴Technical University of Denmark (DTU)

Introduction: Isolated rapid eye movement sleep behavior disorder (iRBD) is a prodromal marker of synucleinopathies. Yet most cases remain undiagnosed due to the poor predictive value of questionnaires and limited access to video-polysomnography (vPSG). We evaluated a 2-stage screening strategy combining a 4-item questionnaire on dream enactment, subjective hyposmia, constipation and orthostatic symptoms (stage 1), followed by home wrist actigraphy (stage 2).

Methods: Participants aged 40–80 without a diagnosis of neurodegenerative disease were recruited from five Mount Sinai and Stanford cohorts. All iRBD cases were vPSG-confirmed. The full cohort included 396 participants (99 cases, 297 controls; mean age 64 ± 11 ; 55% male), of which 289 participants completed the questionnaire, 236 completed 2-week wrist actigraphy, and 129 (75 cases, 54 controls) both assessments. The wearable-based algorithm was built on 4 movement features (mean motor activity, activity index, short or long immobile bouts, twitch activity). Questionnaire-based and wearable-based models were trained with nested cross-validation using XGBoost.

Results: The dream enactment question alone achieved an area under the curve (AUC) of 0.85, which improved to 0.86 with the full 4-item questionnaire. Across the questionnaire dataset (95

cases, 194 controls), dream enactment showed 78% sensitivity and 92% specificity, while the 4-item model achieved 78% sensitivity and 91% specificity. Actigraphy alone achieved an AUC of 0.88, with 82% sensitivity and 84% specificity. At an assumed population prevalence of 1.5%, adjusted positive predictive value was 10% for the 4-item questionnaire and 6% for actigraphy. Among those completing both assessments (75 cases, 54 controls), the 2-stage protocol yielded 68% sensitivity and 100% specificity when preselecting individuals based on the dream-enactment question alone, compared with 73% sensitivity and 100% specificity using the full 4-item questionnaire.

Conclusion: A 2-stage protocol combining questionnaire and actigraphy demonstrated excellent specificity, good sensitivity, and robust generalization for iRBD across both centers and cohorts. This low-cost, scalable strategy is compatible with widely used wearable devices and warrants validation in community-based populations.

Support (if any): Department of Neurology, Icahn School of Medicine at Mount Sinai.

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0786

ASSOCIATION BETWEEN MACHINE LEARNING ACTIGRAPHY MODEL OF RBD PROBABILITIES WITH INCIDENT PARKINSON'S DISEASE AND DEMENTIA IN OLDER UK BIOBANK PATIENTS

Giorgio Ricciardiello Mejia¹, Katarina Gunter², Li Zhou¹, Ankit Parekh¹, Andreas Brink-Kjær³, Emmanuel During¹

¹Icahn School of Medicine at Mount Sinai, ²Oxford University, ³Technical University of Denmark (DTU)

Introduction: Isolated rapid-eye-movement sleep behavior disorder (iRBD) is a strong predictor of Parkinson's disease (PD) and related α -synucleinopathies. Our group and others have shown that wrist accelerometer data and machine learning methods can be used to detect RBD. We aimed to validate this approach in a large community cohort by assessing whether iRBD predictions were associated with an increased risk of incident PD or dementia.

Methods: We analyzed UK Biobank baseline actigraphy data from 26,912 participants older than 60 (mean age 63 ± 2.4 years; mean recording duration 6.7 ± 0.6 days; mean follow-up 8 ± 0.6 years) and applied an iRBD classifier using previously published features to output iRBD probability scores from 4 main, explainable, actigraphy-derived features previously published. A subset of 4,863 participants was used to determine RBD-probability thresholds, defining a "low-risk" (≤ 90 th percentile) versus a "high-risk" (> 90 th percentile) category. Incident diagnoses were identified from ICD-10 codes, and risk ratios (RRs) with 95% CIs were estimated using log-transformed Wald methods.

Results: In the remaining, unseen cohort ($n=22,049$, 63.8 ± 2.8 years), the high-risk group had an RR of 2.28 (95% CI 1.50–3.45) for PD (27 cases/1,440 controls vs. 119 cases/14,603 controls for low-risk) and 2.48 (95% CI 1.55–3.99) for non-Alzheimer's disease (AD) dementia. Although not reaching statistical significance, high risk also predicted dual diagnoses of PD and AD (RR 1.84; 95% CI: 0.41–8.31), PD and non-AD dementia (2.30; 95% CI: 0.87–6.07), and dementia with Lewy body (RR 1.56; 95% CI: 0.35–6.90) which could be due to an insufficient number of incident cases.

Conclusion: Wearable-based 10% "highest risk" prediction of iRBD was associated with more than a two-fold increase in incident risk of PD and non-AD dementia, supporting its utility as a prodromal marker. These results lend support to scalable prodromal risk stratification for synucleinopathies using wearable devices on average 6-7 nights prior to diagnosis.

Support (if any):

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0787

CHARACTERIZATION OF EMG, VIDEO, AND ACTIGRAPHY SIGNALS FOR DETECTING MOTOR ACTIVITY IN REM SLEEP BEHAVIOR DISORDER

Kang Hyun Ryu¹, Giorgio Ricciardiello Mejia¹, Andreas Brink-Kjær², Emmanuel During¹

¹Icahn School of Medicine at Mount Sinai, ²Technical University of Denmark (DTU)

Introduction: Electromyography (EMG), video-polysomnography (vPSG), and wrist actigraphy have each been used to develop diagnostic algorithms for REM sleep behavior disorder (RBD). However, the extent to which they capture overlapping versus distinct motor phenomena remains unknown. We evaluated the respective contributions of actigraphy, EMG and vPSG to the measurement of REM-sleep motor activity.

Methods: Nine adults aged 35–75 with idiopathic RBD ($n=8$) or antidepressant-induced RBD ($n=1$) underwent vPSG and simultaneous bilateral wrist actigraphy (AX-6) at the Mount Sinai Sleep Research Center. Flexor digitorum superficialis EMG activity and video-detected movements were manually scored in 3-second mini epochs, and actigraphy signals were quantified using an acceleration-magnitude-based activity count model following timestamp synchronization. Correlation and agreement analyses were performed to assess the motor events captured by all three, any two, or by each modality independently during REM sleep.

Results: Across 12,941 epochs, EMG, actigraphy, and video independently detected 1,703, 1,613, and 811 motor events, of which 413 were detected concurrently by all three modalities. EMG–actigraphy, EMG–video, and actigraphy–video pairs simultaneously detected 174, 187, and 143 movements, respectively. Modalities showed moderate agreement, with an increasing order of association from EMG–actigraphy ($\kappa = 0.27 \pm 0.10$) to actigraphy–video ($\kappa = 0.41 \pm 0.12$) and EMG–video ($\kappa = 0.45 \pm 0.15$). Of EMG-detected motor events, 49.0% were also detected by actigraphy. Conversely, 37.2% of actigraphy-detected events were detected by EMG, and 34.9% by video. Among video-detected movements, 73.4% were also captured by actigraphy and 66.5% by EMG. Actigraphy activity counts were highest for events detected by all three modalities, followed by actigraphy–video and EMG–actigraphy pairs, and were lowest for actigraphy-only events.

Conclusion: EMG, actigraphy, and video captured partially overlapping motor events in patients with RBD. Among all modalities, actigraphy appeared to be the most sensitive, detecting approximately half of EMG-identified motor events and an additional 63% of events not captured by EMG, whereas manually scored video was the least sensitive.

Support (if any): Department of Neurology, Icahn School of Medicine at Mount Sinai.

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0788

PATIENT-BEDPARTNER SUBJECTIVE SLEEP MISMATCH IN ISOLATED REM SLEEP BEHAVIOR DISORDER IS ASSOCIATED WITH COGNITIVE DECLINE AND CORTICAL THINNING

Jongmok Ha¹, Donald Bliwise¹, Hernis De La Cruz², Chengjie Xiong², Tanis Ferman³, Kejal Kantarci³, Val Lowe³, Susan Criswell⁴, Alon Avidan⁵, Yo-El Ju², Miranda Lim⁶, Mitchell Miglis⁷, Ronald Postuma⁸, Aleksandar Videnovic⁹, Lynn Trotti¹

¹Emory University, ²Washington University in St. Louis, ³Mayo Clinic, ⁴Barrow Neurological Institute, ⁵UCLA, ⁶VA Portland Health Care System, Research Service, ⁷Stanford University, ⁸McGill University, ⁹Harvard Medical School

Introduction: Patients with Parkinson's disease commonly under-report sleep symptoms, but the extent to which such mismatch may be present in people with isolated RBD (iRBD) is unknown. We evaluated how the patient-bedpartner (PT-BP) mismatch in night-time and daytime sleep complaints relates to cognition, apathy, dopaminergic degeneration, and cortical structure in iRBD.

Methods: We retrospectively analyzed 425 iRBD participants (2018–2025) from the North American Prodromal Synucleinopathy (NAPS) Consortium with clinicodemographic data, dopamine transporter (DAT) imaging, and magnetic resonance imaging. Using Scales for Outcomes in Parkinson's Disease (SCOPA)-Sleep, PT-BP mismatch was classified into overestimator (PT>BP), concordant (PT=BP), and underestimator (PT<BP) groups, separately for complaints during night and day. Outcomes included cognition (CDR-Sum of Boxes [CDR-SB], CDR-global, and individual subdomain tests), pareidolia, apathy, subregional DAT uptake, and cortical thickness. Group differences were tested with analysis of covariance adjusting for age, sex, disease duration, education, clinician-rated OSA treatment inadequacy, and the corresponding patient-reported SCOPA-Sleep domain (night or day), and estimated total intracranial volume for cortical thickness; pairwise tests used Bonferroni correction.

Results: The PT-BP mismatch was common (night – overestimator 127/425, 29.9% and underestimator 116/425, 27.3%; day – overestimator 77/425, 18.1% and underestimator 134/425, 31.5%). For night-time mismatch, underestimators showed lower CDR-SB and lower CDR-global than overestimators. In addition, underestimators exhibited more illusory responses, fewer correct noise rejections, and fewer total correct responses than overestimator and concordant groups. For daytime mismatch, CDR-SB was lower in underestimators versus overestimators; CDR-global was lower in underestimators and concordant participants versus overestimators. No significant associations were found for apathy. Subregional DAT uptake did not differ by mismatch group. Cortical thickness analyses revealed thinner right transverse gyrus in underestimator and concordant groups compared to the overestimator group and thinner left superior temporal gyrus in underestimator group compared to overestimator group, for night-time mismatch only.

Conclusion: The PT-BP subjective sleep mismatch can be used as a clinical marker associated with overall cognitive decline and cortical thinning in auditory and language processing areas, which may underlie impairment in perceptual interpretation and hallucination proneness. Further research is warranted to seek longitudinal change and phenoconversion in mismatch groups.

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0789

ASSOCIATIONS BETWEEN OBSTRUCTIVE SLEEP APNEA AND PERIODIC LIMB MOVEMENTS IN A PEDIATRIC COHORT WITH ELEVATED PLMD INDEX

Niraj Rama¹, Aashka Sheth¹, Jawad Kahir¹, Brandon Peters², Karim El-Kersh³, Egambaram Senthilvel¹

¹University of Louisville School of Medicine, ²Norton Healthcare, ³University of Arizona School of Medicine

Introduction: Although prior studies suggest a bidirectional or masking relationship between obstructive sleep apnea (OSA) and elevated periodic limb movement index (PLMI), the true interaction between respiratory disturbance severity and limb movement activity in pediatric populations remains unclear. The aims of this study were to (1) compare demographic, clinical, and polysomnographic characteristics of children with elevated PLMI stratified by OSA severity; (2) evaluate the association between OSA and PLMI; and (3) identify independent predictors of PLMI.

Methods: This was a retrospective study involved children ≤18 years with elevated PLMI (> 5 events/h) at a tertiary pediatric sleep center from 2020–2024. OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 1.5 events/h), mild (1.5–4.9 events/h), moderate (5–9.9 events/h), and severe (≥ 10 events/h).

Results: Out of 4,571 studies in 4 years, 542 children (12.0%) had an elevated PLMI, of which 223 (41%) had no OSA, and 319 (59%) had OSA. Race distribution, BMI z-score, and tonsillar grade differed significantly across OSA severity groups ($p < 0.01$). Restless legs syndrome, restless sleep, and PLMI ≥10/h were more prevalent in OSA, increasing with OSA severity ($p=0.024$, $p < 0.0001$, and $p < 0.0001$, respectively). The median PLMI was significantly higher in OSA vs. non-OSA (10.4 vs. 8.0 events/hr, $p < 0.0001$). Total PLMS and PLMI increased progressively across OSA severity categories ($p=0.004$ and $p < 0.0001$). Iron indices did not differ between groups. OAH showed a significant positive correlation with the PLMI ($r=0.198$, $p < 0.0001$). For every 1-unit increase in OAH, the PLMI increases by a factor of $\exp(0.01) = 1.01$ (or 1%). In multivariable modeling, higher OAH ($\beta=0.010$, $p < 0.001$) and use of antihistamines or SSRIs ($\beta=0.27$, $p=0.003$) independently predicted higher PLMI, whereas female sex predicted a lower PLMI ($\beta=-0.11$, $p=0.029$).

Conclusion: In children with elevated PLMI, OSA is associated with higher PLMI burden, higher PLMI, and increased prevalence of restless sleep and RLS symptoms. Although the correlation between OAH and PLMI is modest, OSA severity independently predicts PLMI after adjustment for confounders. These findings suggest a clinically meaningful link between respiratory obstruction and limb-movement activity in pediatric sleep disorders.

Support (if any):

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0790

CLINICAL AND DEMOGRAPHIC CHARACTERISTICS OF ISOLATED REM SLEEP BEHAVIOUR DISORDER WITH AND WITHOUT OBSTRUCTIVE SLEEP APNOEA

Nikita Gurbani¹, Lachlan Stranks¹, Kariem Elhaad², Pablo Iriarte³, Sean Higgins¹, Adam Birdseye¹, Joshua Benson¹, Chad Whittle¹

Elisa Bruno¹, Johan Meurling¹, Guy Leschiner¹,
Laura Perez-Carbonell¹

¹Guy's and St. Thomas' NHS Foundation Trust, ²Liverpool
University Hospitals NHS Foundation Trust, ³Hospital
Universitario Donostia

Introduction: Isolated rapid eye movement (REM) sleep behaviour disorder (iRBD) is characterised by dream-enactment behaviours and loss of muscle REM atonia on polysomnogram (PSG) and represents a prodromal marker of α -synucleinopathies (e.g. Parkinson's disease; PD). Obstructive sleep apnoea (OSA) involves recurrent upper airway collapse and intermittent hypoxia. OSA has been linked to neurodegeneration, with reports of increased α -synuclein levels in OSA patients, and is proposed as an independent predictor of PD. iRBD and OSA frequently coexist yet their interaction remains unclear. This study assesses demographic and clinical differences in iRBD patients, with and without OSA.

Methods: Patients with PSG-confirmed iRBD and symptom onset ≥ 45 years were included from our Sleep Disorders Centre. OSA was defined as apnoea-hypopnoea index (AHI) ≥ 5 events/hour at iRBD diagnosis. Demographic, clinical, and PSG data were collected from electronic records. Results are presented as mean $\pm$ standard deviation, unless otherwise specified.

Results: 205 individuals were included (age 68.1 ± 7.8 years, 82.4% male); age at iRBD diagnosis 65.4 ± 7.4 years; 91 (44.4%) had OSA (overall AHI 17.1 ± 12.8 , 20% severe). Kaplan–Meier analysis showed that, over 2.68 ± 2.85 years, 13.7% of patients phenoconverted. In the OSA group, BMI was higher (29.2 ± 4.7 vs 27.0 ± 4.3 kg/m², $p=0.001$), sexual dysfunction was more common (50.0% vs 32.6%, $p=0.033$), and hyposmia was less prevalent (51.1% vs 65.7%, $p=0.042$). Individuals with sexual dysfunction spent more sleep time with SpO₂ < 90% (8.8 ± 21.6 vs $1.5 \pm 5.0\%$, $p=0.011$), had lower mean nocturnal SpO₂ (93.7 ± 2.1 vs $94.5 \pm 1.5\%$, $p=0.005$) and higher oxygen desaturation index (9.4 ± 12.1 vs 5.4 ± 7.2 , $p=0.023$). Within phenoconverted patients, 39% had OSA; time from iRBD diagnosis to phenoconversion was similar between groups (non-OSA 5.2 ± 3.8 vs OSA 4.4 ± 3.7 years). On adjusted multivariate analysis, lower mean nocturnal SpO₂ was independently associated with cognitive dysfunction at baseline (OR 1.09, $p=0.009$).

Conclusion: In iRBD, OSA is highly prevalent and associates with higher BMI, sexual dysfunction and less hyposmia. OSA may contribute to dysautonomia features, such as sexual dysfunction in iRBD. No significant differences were observed in proportion or time to phenoconversion between groups. Nocturnal hypoxia may relate to increased odds of cognitive dysfunction. Longitudinal studies with longer follow-ups are warranted to clarify clinical differences and prognostic implications of OSA in iRBD.

Support (if any):

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0791

COGNITIVE AND MOTOR WOBBLING IN ISOLATED RBD: A MULTICENTRIC STUDY BY THE INTERNATIONAL RBD STUDY GROUP (IRBDSG)

Ambra Stefani

Medical University Innsbruck

Introduction: Patients with isolated RBD (iRBD) often develop motor and non-motor signs/symptoms before phenoconversion to overt alpha-synucleinopathy. These may wobble for a long time, making the timing of phenoconversion difficult. Although such patients may be called prodromal PD, DLB or MSA, they do

not yet fulfil diagnostic criteria for a neurodegenerative disorder. This study aimed at defining and characterizing the clinically fluctuating transition phases from iRBD to possible overt alpha-synucleinopathy.

Methods: IRBDSG centers included patients with >3-year follow-up, who underwent ≥ 3 assessments at intervals ≥ 6 months apart. A wobble event was defined as an improvement at least once in ≥ 1 of the following: MDS-UPDRS III (≥ 4 points); MoCA (≥ 4 points)/MMSE (≥ 3 points)/MCI reverting to normal; orthostatic hypotension reverting to normal. PD, DLB or MSA criteria could not be fulfilled at any timepoint.

Results: 87 iRBD wobblers (17.2% female) from 15 centres (Europe, Canada, USA, Australia, Asia) were included. Mean age at iRBD diagnosis was 65.3 ± 7.2 y, with a time from diagnosis to first wobble event of 4.9 ± 4.3 y. At baseline the MDS-UPDRS-III was 3.7 ± 3.6 and MoCA 23.7 ± 3.2 (MCI 26.1%). At baseline, 13.0% presented OH, 55.6% cardiovascular disease, 29.6% psychiatric disorder, and 12.0% diabetes mellitus. 50.0% of the patients were taking symptomatic treatment for RBD. 41 patients (48%) were classified as pure cognitive (C) wobblers, 22 (25%) as pure motor (M) wobblers, 19 (22%) as both cognitive and motor (C+M) wobblers. Age at RBD diagnosis, sex, time from diagnosis to first wobble event, presence of MCI, OH, comorbidities, and use of RBD symptomatic treatment did not differ among groups. At baseline, the MDS-UPDRS-III score was higher in the M wobblers and in the C+M wobblers, compared to the C wobblers. The MoCA score was lower in the C wobblers and in the C+M wobblers, compared to the M wobblers.

Conclusion: In iRBD, cognitive and motor symptoms can wobble over time, making the diagnosis of phenoconversion difficult. Wobbling is yet unreported in iRBD and presents important clinical and research implications: if these measures are selected as outcomes in neuroprotective trials, wobbling could be misinterpreted as treatment efficacy. Further observations of wobblers are necessary to determine their final outcomes.

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0792

EFFICACY AND TEMPORAL TRAJECTORY OF TONIC MOTOR ACTIVATION IN PAINFUL AND PAINLESS RESTLESS LEGS: INTERIM 270-DAY RESULTS FROM THE THRIVE STUDY

Elias Karroum¹, Kurtis Swartz², Joseph Ojile³, Mark Buchfuhrer⁴,
Haramandeep Singh⁵, Asim Roy⁶, Richard Bogan⁷, Robert Thomas⁸,
Avinash Aggarwal⁹, Jonathan Charlesworth²

¹Department of Neurology, University of Virginia School of Medicine, ²Noctrix Health, Inc., ³Clayton Sleep Institute, LLC,

⁴Stanford University School of Medicine, ⁵Sleep Medicine Specialists of CA, ⁶Ohio Sleep Medicine Institute, ⁷University of South Carolina School of Medicine, ⁸Beth Israel Deaconess Medical Center, ⁹UPMC

Introduction: Restless Legs Syndrome (RLS) presents in painful and painless forms, with the painful phenotype indicating a more severe clinical course. Data comparing treatment efficacy between these groups is scarce. This study analyses real-world 270-day interim efficacy and safety of tonic motor activation (TOMAC), a non-invasive high-frequency peroneal nerve stimulator, in painful versus painless RLS patients.

Methods: Data were pooled from the THRIVE study, a longitudinal, post-market study evaluating TOMAC effectiveness and safety in adults with primary moderate-severe refractory RLS. Baseline

variables included age, sex, RLS family history, RLS age-at-onset, current RLS medications, TOMAC titrated stimulation intensity, International RLS Severity Scale (IRLS), Medical Outcomes Study Sleep Problem Index II (MOS-II), and RLS symptom days per week. Painful RLS was defined by affirmative answers to two consecutive baseline questions on the presence of unpleasant, uncomfortable, and specifically painful feelings in the legs. Primary endpoint was 270-day change in IRLS score. Secondary endpoints included changes in MOS-II score, RLS symptom days per week, and Clinical Global Impression-Improvement (CGI-I) and Patient Global Impression-Improvement (PGI-I) responder rates. The temporal trajectory (at 90, 180, and 270 days) of each endpoint was also analyzed by Mixed Model for Repeated Measures (MMRM). RLS medication changes and TOMAC safety were compared.

Results: The intent-to-treat population included 127 adult patients (56 painful RLS, 71 painless RLS) with moderate-to-severe, medication-refractory RLS. At baseline, painful RLS patients had more severe symptoms (mean [standard deviation] IRLS scores: 27.2 [5.3] versus 24.5 [5.7]; $P=0.007$) and used more dopaminergic agents (68% versus 49%; $P=0.036$). All other baseline variables listed above were similar. After 270 days of TOMAC, mean changes in IRLS scores, MOS-II scores, and RLS symptom days per week were similar between groups. Responder rates (CGI-I, PGI-I), RLS medication changes, and adverse event rates were similar. MMRM confirmed similar improvements for key endpoints starting at 90 days and persisting through 270 days in both groups.

Conclusion: This study confirms painful RLS as a more severe phenotype at baseline. However, TOMAC treatment demonstrated consistent and similar efficacy, safety, and temporal trajectory between the two phenotypes, with both maintaining significant improvements over a nine-month period.

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0793

EFFICACY OF CLINICAL HYPNOSIS IN TREATING PARASOMNIAS: A RETROSPECTIVE COHORT STUDY

Bhanu Kolla, Caroline Mifsud, Alessio Gugliotta, Jarret Richardson, Meghna Mansukhani
Mayo Clinic

Introduction: Clinical hypnosis is among the limited treatment options currently available to mitigate the symptom burden associated with parasomnias; however, there is scant literature regarding its effectiveness. We conducted a retrospective cohort study to examine the efficacy of clinical hypnosis in treating parasomnias.

Methods: We included all adult patients with research authorization on file who were referred for clinical hypnosis for the management of parasomnias at the Mayo Clinic Center for Sleep Medicine. Data on demographics, type and frequency of parasomnia(s), number of hypnosis sessions, concurrent medication(s), and polysomnographic variables were extracted. Information about the efficacy of treatment, including patient reports of change in intensity and frequency was extracted where available. A Clinical Global Impression-Improvement (CGI-I) score was assigned based on review of the follow up note.

Results: A total of 134 patients received clinical hypnosis. A majority of the sample was female (65.67%) with a median age of 41.5 years. The most common indications were non-rapid eye movement (REM) parasomnia (33), REM sleep behavior disorder

(27), nightmare disorder (24), parasomnia overlap disorder (11), and sleep-related eating disorder (8). Follow up data were available on 76 patients (56.71%). Of these, a total of 47/76 (61.84%) reported subjective improvement in parasomnias following hypnosis. The median CGI-I score was 3.07 ± 1.22 ; a total of 23/76 (30.26%) reported substantial improvement and 19/76 (25.0%) reported some improvement based on the CGI scores.

Conclusion: A majority of patients reported improvement in symptoms. Clinical hypnosis was effective for both non-REM and REM parasomnias. Given its relative safety and minimal potential adverse effects, clinical hypnosis remains an effective first-line treatment option for parasomnias.

Support (if any):

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0794

LONG-TERM REAL-WORLD OUTCOMES OF TONIC MOTOR ACTIVATION (TOMAC) FOR REFRACTORY RESTLESS LEGS SYNDROME (RLS): INTERIM 1-YEAR DATA FROM THE THRIVE STUDY

Avinash Aggarwal¹, Mark Buchfuhrer², Haramandeep Singh³, Asim Roy⁴, Joseph Ojile⁵, Richard Bogan⁶, Robert Thomas⁷, Kurtis Swartz⁸, Jessica Preciado⁸, Jonathan Charlesworth⁸

¹UPMC, ²Stanford University School of Medicine, ³Sleep Medicine Specialists of CA, ⁴Ohio Sleep Medicine Institute, ⁵Clayton Sleep Institute, LLC, ⁶University of South Carolina School of Medicine, ⁷Beth Israel Deaconess Medical Center, ⁸Noctrix Health, Inc.

Introduction: Tonic motor activation (TOMAC) is a non-invasive therapy which delivers high-frequency electrical stimulation to the peroneal nerve to reduce symptoms of restless legs syndrome (RLS). Here, we report for the first time on 1-year outcomes from patients prescribed TOMAC therapy.

Methods: All patients who were prescribed Nidra® TOMAC (Noctrix Health Inc.) were invited to participate in the THRIVE multicenter prospective observational post-market study. In accordance with the prespecified statistical analysis plan, we conducted intent-to-treat analysis of all patients who met the FDA indication for TOMAC (adults with primary moderate-severe refractory RLS who were not contraindicated). Patients in this indicated intent-to-treat (IITT) population who were enrolled >1 year before the analysis date (October 15th, 2025) were analyzed. Missing data were imputed. Outcome metrics were collected at baseline prior to starting TOMAC and during follow-up visits every 90 days. The prespecified primary outcome was change in IRLS score at 1 year compared to baseline. Secondary outcomes were PGI-I score, CGI-I score, change in MOS-II score, and change in days per week with RLS symptoms at 1 year relative to baseline.

Results: The interim IITT population included 78 patients. IRLS score reduced from 26.1 at baseline to 16.7 at 1 year of TOMAC, a mean change of -9.4 (95% CI: -11.0, -7.8). PGI-I score was 2.6 (95% CI: 2.3, 2.9; responder rate: 54%) and CGI-I score was 2.3 (95% CI: 2.0, 2.6; responder rate: 65%). MOS-II reduced from 53.0 to 40.5, a mean change of -12.5 (95% CI: -17.0, -8.0). Days per week with RLS symptoms reduced from 6.2 to 4.4, a mean change of -1.8 days (95% CI: -1.3, -2.3). Of the 43 patients on dopamine agonist medication at baseline, 15 reduced dosage (average dosage reduction: 60%, 95% CI: 45%, 85%) and 4 increased dosage. The most common adverse effects were administration site reactions; none were serious or severe.

Conclusion: These interim data suggest that TOMAC therapy is safe and effective through 1 year of use. Response in real-world

clinical practice is similar to previously reported outcomes from randomized clinical trials.

Support (if any): The THRIVE study was sponsored by Noctrix Health, Inc.

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0795

POLYSOMNOGRAPHIC AND CLINICAL ASSOCIATIONS OF COMORBID OBSTRUCTIVE SLEEP APNEA AND RESTLESS LEGS SYNDROME (CO-ROSA)

Jasmeet Sandhu¹, Melissa Palomino², Lourdes DelRosso¹

¹University of California San Francisco, Fresno, ²Inspire Health Sleep Center

Introduction: The coexistence of obstructive sleep apnea (OSA) and restless legs syndrome (RLS), recently termed Co-ROSA, has been increasingly recognized but remains underexplored. This study aimed to compare comorbidities, sleep architecture, and psychiatric outcomes in patients with Co-ROSA with controls, OSA, and RLS alone. The central research question was whether Co-ROSA represents a distinct phenotype with amplified risk for specific comorbidities.

Methods: We studied adults undergoing in-laboratory polysomnography (PSG) at an academic sleep center. Patients were classified into four groups: Group 0 (neither condition), Group 1 (OSA only), Group 2 (Co-ROSA), and Group 3 (RLS only). Demographics, comorbidities, medication use, and PSG parameters were compared between groups using ANOVA, chi-square tests, and multivariable logistic regression. We examined associations with medical and psychiatric comorbidities, adjusting for age, sex, BMI, and medication use.

Results: A total of 153 patients were included. The mean age was 58.0 ± 21.1 years in Group 0, 54.6 ± 19.9 in Group 1, 54.2 ± 16.2 in Group 2, and 64.8 ± 12.7 in Group 3. The proportion of male participants was 55.6% in Group 0, 60.0% in Group 1, 56.5% in Group 2, and 37.5% in Group 3. Patients with Co-ROSA (group 2) had longer sleep latency (23.9 ± 22.2 minutes), shorter total sleep time (330.8 ± 67.5 minutes), and higher WASO (wake after sleep onset: 74.7 ± 53.3 minutes) compared to Groups 0 and 1, although not statistically significant. Group 2 also exhibited the highest rates of anxiety (63.2%) and depression (52.6%) compared to all other groups ($p < 0.05$). Regression analyses confirmed Co-ROSA as an independent predictor of both anxiety (OR 1.69, 95% CI 1.07–2.67, $p=0.023$) and depression (OR 1.84, 95% CI 1.10–3.09, $p=0.021$). When compared to OSA alone, patients with Co-ROSA had fourfold higher odds of anxiety (OR 4.24, 95% CI 1.47–12.26) and higher odds of depression (OR 2.94, 95% CI 1.04–8.31). Odds ratios for other medical comorbidities, including diabetes, hypertension, chronic kidney disease, peripheral neuropathy, and insomnia, did not reach statistical significance.

Conclusion: Patients with Co-ROSA represent a high-risk subgroup with disproportionately elevated risk of depression and anxiety independent of demographic and pharmacologic confounders. Polysomnographic, comorbidities, or medication use were not statistically significant.

Support (if any): none

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0796

RESTLESS LEGS SYNDROME IS NOT ASSOCIATED WITH INCREASED BRAIN AGE: INSIGHTS FROM THE SLEEP HEART HEALTH STUDY

Himal Purani¹, Ananta Ghimire², Haoqi Sun³, Sasikanth Gorantla¹

¹University of California Davis Medical Center, ²Biostatistics, CoGuide Academy, ³Beth Israel Deaconess Medical Center

Introduction: Patients with restless legs syndrome (RLS) tend to have poor sleep quality. Sleep Heart Health Study (SHHS) data showed increased odds of cardiovascular disease (CVD) with RLS. However, the impact of RLS on brain aging is unknown. We hypothesized that RLS is associated with accelerated brain aging.

Methods: The RLS cohort was derived from a subset of the SHHS visit 2 (SHHS2) using standardized symptom-based criteria such as urge to move legs, worsening at rest, relief with movement, and evening or nighttime predominance. We used sleep EEG-based brain age index (BAI) to quantify brain aging. BAI measures the difference between an individual's brain age and their chronological age. The BAI machine learning model was trained on a cohort of brain-healthy participants. Among 2,651 participants with available BAI, 135 had RLS. The Mann-Whitney U test was used for continuous variables and Chi-squared test was used to compare the categorical variables between the two groups (RLS vs non RLS).

Results: The RLS cohort had more females (68.9% vs 52.9%, $p < 0.001$) and a higher prevalence of hypertension (63.7% vs 53.1%, $p=0.016$), diabetes (4.4% vs 1.4%, $p=0.015$), and benzodiazepine use (9.6% vs 5.0%, $p=0.042$) compared to non-RLS controls. However, there was no statistically significant difference in median BAI between the RLS (BAI = 0 years) and non-RLS group (BAI = 0.12 years) after controlling for potential confounders. RLS symptom frequency (> 15 days/month vs 5–15 days/month) was not associated with accelerated brain aging. BAI of high and low symptom frequency was + 0.56 and -0.54 years ($p=0.781$), respectively.

Conclusion: Using the SHHS2 dataset, RLS and its symptom frequency did not influence BAI, despite well-established negative impact of RLS on sleep quality. BAI is derived from cortical sleep EEG features, and RLS appears to have predominantly subcortical pathophysiology (striatum and thalamus). Therefore, subcortical abnormalities may not manifest as measurable cortical aging as measured by sleep EEG. Further studies are warranted to confirm these observations.

Support (if any):

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0797

RESTLESS LEGS SYNDROME AND FITNESS-TO-DRIVE

Cristian Palmiere

CURML

Introduction: Restless legs syndrome (RLS) is a neurological condition that causes an irresistible urge to move the legs. People with RLS commonly feel symptoms in the late afternoon or evening hours. RLS can severely interrupt sleep, making it difficult to fall asleep or return to sleep after waking up. This can be responsible

for increased daytime fatigue, daytime sleepiness, and in the long term an increased incidence of traffic accidents. The aim of this study was to investigate the incidence of the diagnosis of RLS in the population of subjects who came to our facility between January 2022 and December 2025, following an administrative decision requiring a fitness-to-drive medical assessment after traffic violations not related to daytime sleepiness (i.e. driving under the influence of alcohol).

Methods: To carry out the present study, data relating to 2,000 subjects were analyzed over a period of four years (subjects of both sexes aged between 18 and 75 years). The subjects recruited for the study came to our facility for traffic violations related to the consumption of alcohol and/or illicit drugs. Individuals who came to our observation following episodes of sudden loss of consciousness while driving were not considered.

Results: 140 subjects reported a diagnosis of RLS (diagnosis made within the previous ten years), with varying levels of care (primary care physician in the majority of cases) and variable pharmacological treatments. 120 subjects reported optimal control of RLS, while 20 subjects reported problems with daytime sleepiness.

Conclusion: As already highlighted by other authors in the past, the diagnosis of RLS must be carefully sought and assessed as part of a general evaluation of fitness to drive, considering the potential risks associated with increased daytime sleepiness.

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0798

CLINICAL AND MORTALITY PROFILES OF VETERANS WITH REM BEHAVIOR DISORDER ALONE VS. COMORBID PTSD OR PARKINSON'S DISEASE: A NATIONAL VA COHORT STUDY

Melissa Jones¹, Javad Razjouyan¹, Carlos Schenck², Erik St Louis³, Ricardo Jorge¹, Amir Sharafkhaneh¹

¹Michael E. DeBakey VA Medical Center, ²Hennepin County Medical Center, ³Mayo Clinic

Introduction: Rapid eye movement (REM) sleep behavior disorder (RBD) is a parasomnia strongly associated with α -synucleinopathies, most commonly Parkinson's disease (PD). Among Veterans, posttraumatic stress disorder (PTSD) is common and may influence RBD presentation and outcomes. The extent to which PTSD modifies demographic, medical, and mortality profiles in Veterans with RBD, and how these differ from those with RBD and Parkinson's disease (PD), remains poorly characterized.

Methods: We conducted a retrospective cohort study using the Veterans Health Administration Corporate Data Warehouse. Veterans with at least one ICD-9 or ICD-10 diagnostic code for RBD were identified between 1999 - 2020 and categorized into three, mutually-exclusive groups based on the presence or absence of co-occurring ICD codes: RBD-only, RBD+PTSD, or RBD+PD. Demographics, comorbidities (Charlson Comorbidity Index [CCI]), and mortality outcomes were compared using logistic regression models adjusted for age, sex, race/ethnicity, BMI, and CCI.

Results: The cohort included 11,283 Veterans with RBD only, 17,527 with RBD+PTSD, and 5,675 with RBD+PD. Veterans with RBD+PTSD were younger (mean 58.9 ± 14.9 y) and had higher psychiatric comorbidity (94.2%) compared to RBD only (54.2%) or RBD+PD (46.5%). Those with RBD+PD were older (73.6 ± 8.1 y), predominantly male (98.9%), and had the highest neurological comorbidity (92.6%). Unadjusted mortality was lowest

in RBD+PTSD (15.3%) and highest in RBD+PD (53.6%). Adjusted models showed reduced mortality risk for RBD+PTSD (aOR 0.73, 95% CI 0.70–0.80, $p < 0.001$) and increased risk for RBD+PD (aOR 2.43, 95% CI 2.3–2.6, $p < 0.001$) vs. RBD alone. Higher age, male sex, and greater comorbidity independently predicted mortality.

Conclusion: In this large national VA cohort, comorbid PTSD and Parkinson's disease were associated with distinct demographic and clinical profiles among Veterans with RBD. RBD+PTSD was linked to younger age, greater psychiatric burden, and lower mortality. These findings underscore the heterogeneity of RBD in Veterans and support stratified approaches to surveillance for synucleinopathy and trauma-related sleep disturbances.

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0799

RESTING-STATE EEG SUBTYPE AND STAGE INFERENCE IDENTIFIES DISTINCT PRODROMAL BIOTYPES AND STAGING IN IRBD

Jung-won Shin¹, Soonhyun Yook², Tae-Gon Noh³, Sumin Bae⁴, Ki-Young Jung⁵, Hosung Kim²

¹CHA Bundang Medical Center, CHA University, ²Keck School of Medicine of University of Southern California, USC Steven Neuroimaging and Informatics Institute, ³Interdisciplinary Program in Neuroscience, College of Natural Sciences, Seoul National University, ⁴Seoul National University, ⁵Seoul National University College of Medicine

Introduction: Idiopathic REM Sleep Behavior Disorder (iRBD) provides a critical preclinical window into α -synucleinopathy. Given the substantial heterogeneity in clinical trajectories, developing a biologically grounded framework for staging this prodromal phase is essential. We applied SuStaIn (Subtype and Stage Inference) modeling to resting-state electroencephalography (EEG) to identify distinct prodromal biotypes and evaluate their relevance using long-term phenotypic outcomes.

Methods: A total of 285 participants (51 healthy controls, 234 iRBD) were drawn from a prospective cohort with standardized assessments and baseline/biannual EEG. Among iRBD participants, 39 converted (iRBD-CV) and 195 remained non-converted (iRBD-NC). Twenty-four EEG spectral-power features across eight cortical regions, standardized to healthy controls, were entered into the SuStaIn model to infer latent subtypes and stage trajectories. Longitudinal EEG was used to validate subtype stability, track stage progression, and examine associations with cognitive and clinical outcomes.

Results: SuStaIn modeling revealed two distinct EEG-based prodromal biotypes. Subtype 1 exhibited a focal reduction in posterior beta power that remained stable across stages. During follow-up, the majority of this group (89.5%) transitioned toward "Subtype 0," indicating reversal of the posterior beta abnormality, and all individuals remained non-converted. Subtype 1 also showed higher educational attainment and a greater proportion of males. In contrast, Subtype 2 demonstrated a progressive trajectory beginning with early frontal theta elevations and extending to delta abnormalities. Within Subtype 2, higher stages were significantly associated with lower MoCA scores. Longitudinal EEG demonstrated significant stage advancement ($p = 0.00013$), with the most pronounced progression occurring in Subtype 2 and among converters.

Conclusion: SuStaIn modeling of resting-state EEG delineated biologically prodromal biotypes in iRBD, revealing two mechanistically distinct progression pathways: an adaptive-compensatory subtype (Subtype 1) and a progressive-degenerative subtype (Subtype 2). Subtype 1, marked by isolated posterior beta reduction without abnormalities in other regions and subsequent reversal over time, appears to reflect a compensatory mechanism underlying clinical stability. In contrast, Subtype 2, characterized by early and widespread theta-delta increases, represents an actively degenerating trajectory associated with cognitive decline. These findings demonstrate that early EEG-monitoring-based SuStaIn staging can stratify stable versus progressing iRBD, underscoring the prodromal period as a key window for disease-modifying interventions.

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0800

INDEPENDENT CONTRIBUTIONS OF APERIODIC AND PERIODIC EEG FEATURES AS PROGNOSTIC BIOMARKERS FOR PHENOCONVERSION TO α -SYNUCLEINOPATHIES IN IRBD

Eung-Gyu Lee¹, Tae-Gon Noh², Ki-Young Jung³

¹Seoul National University Hospital, ²Interdisciplinary Program in Neuroscience, College of Natural Sciences, Seoul National University, ³Seoul National University College of Medicine

Introduction: Isolated REM sleep behavior disorder (iRBD) is considered a prodromal stage of α -synucleinopathies such as Parkinson's disease (PD) and dementia with Lewy bodies (DLB). Identifying early biomarkers to predict phenoconversion is essential. Previous electroencephalographic (EEG) studies have mainly relied on conventional power spectrum analysis where periodic and aperiodic components are not separated. This study aimed to assess whether independently distinguished aperiodic and periodic components can differentiate iRBD converters (iRBD-CV) from non-converters (iRBD-NC).

Methods: We analyzed baseline eye-closed resting EEG from 134 participants (108 iRBD-NC, 26 iRBD-CV: 18 PD-CV, and 8 DLB-CV). Original spectra were computed for the delta (1–4 Hz), theta (4–8 Hz), alpha (8–13 Hz), beta (13–30 Hz), and gamma (30–50 Hz). Aperiodic components (offset and slope: 2–50 Hz; low-frequency slope: 2–30 Hz; high-frequency slope: 30–50 Hz) were estimated and subtracted to obtain periodic spectra. Correlation analyses assessed associations between EEG features and clinical variables.

Results: DLB-CV was significantly older than the other groups (66.47±6.32 vs. 67.50±6.42 vs. 75.62±7.39 years, $p=0.008$) and had fewer years of education (12.92±4.08 vs. 11.89±3.88 vs. 8.25±4.17 years, $p=0.013$). MMSE and MoCA scores were lower in DLB-CV. PD-CV showed higher theta and alpha in the original spectrum. After removing the aperiodic component, only DLB-CV showed increased periodic theta, whereas significance did not remain in PD-CV. In DLB-CV, the posterior regions showed an increased offset, steeper low-frequency slope, and a reduction in periodic dominant occipital frequency (DOF). Spearman correlation analysis, performed within iRBD-CV, revealed that periodic theta was correlated with MMSE ($r=-0.421$, $p=0.032$). Offset correlated with MMSE ($r=-0.534$, $p=0.005$) and UPDRS-III ($r=0.605$, $p=0.010$). Periodic DOF and low-frequency slope were associated with both

MMSE ($r=0.455$, $p=0.019$; $r=-0.697$, $p < 0.001$) and MoCA ($r=0.400$, $p=0.043$; $r=-0.609$, $p < 0.001$).

Conclusion: This study demonstrated that both aperiodic and periodic components of iRBD may serve as independent biomarkers for predicting phenoconversion to α -synucleinopathies. EEG slowing was more clearly captured within the periodic spectrum. The low-frequency slope of aperiodic component may serve as a biomarker reflecting cognitive function, whereas the offset appears to reflect motor function.

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0801

DIVERGENT DOPAMINE-IRON MOLECULAR SIGNATURES DIFFERENTIATE RESTLESS LEGS SYNDROME FROM PARKINSON'S DISEASE

Maria Mogavero¹, Giovanna Marchese², Giovanna Maria Ventola², Giuseppe Lanza¹, Michele Salemi¹, Amedeo Antoci¹, Oliviero Bruni³, Raffaele Ferri¹

¹Oasi Research Institute, ²Genomix4Life, ³University of Rome "La Sapienza"

Introduction: Restless legs syndrome (RLS) and Parkinson's disease (PD) both respond to dopaminergic therapies and may co-occur clinically, yet it remains uncertain whether they share common biological substrates or represent distinct pathophysiological entities. In particular, dopamine handling and iron metabolism appear oppositely altered in the two conditions. We performed a targeted transcriptomic comparison to clarify similarities and differences in dopamine- and iron-related molecular pathways.

Methods: Peripheral blood RNA sequencing was performed in patients with idiopathic RLS ($n = 17$) and PD ($n = 63$), diagnosed according to international criteria. After quality control and filtering, 23,331 expressed genes were analyzed. Differential expression analysis between groups was conducted adjusting for age and sex, using a threshold of adjusted $p \leq 0.01$ and $|\text{fold change}| \geq 2.5$. Genes involved in dopamine metabolism/signaling and iron transport, utilization, and ferroptosis were examined in detail.

Results: A total of 2,925 transcripts were differentially expressed between RLS and PD. In the dopamine axis, RLS showed upregulation of catechol-O-methyltransferase-related genes (COMT, LRTOMT) and downregulation of PTS, a key enzyme for tetrahydrobiopterin synthesis, suggesting increased dopamine turnover with limited synthetic capacity. In the iron axis, RLS displayed upregulation of genes promoting iron export and mitochondrial/heme utilization (SLC40A1, HEPH, SLC25A37/39, ALAS2, FECH, GLRX5) and downregulation of TFRC, consistent with an iron-mobilization program under conditions of restricted availability. These patterns contrasted with PD, a disorder characterized by nigrostriatal neurodegeneration and brain iron accumulation.

Conclusion: RLS and PD exhibit divergent transcriptomic signatures within the dopamine-iron regulatory network, reflecting functional dopaminergic dysregulation with brain iron deficiency in RLS versus structural neurodegeneration with iron overload in PD. These findings support distinct biological mechanisms underlying the clinical features and have implications for biomarker development and targeted therapies.

Support (if any): This study was supported by institutional research funds.

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0802

IMPACT OF HIGH INTENSITY ACUTE EXERCISE ON IDIOPATHIC RLS SYMPTOMS: PRELIMINARY RESULTS FROM THE PEARLS STUDY

Katie Cederberg¹, Reetu Joshi¹, Emerson Dickstein¹, Chuc Luu¹, Emmanuel Mignot²

¹Stanford University, ²Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: Restless legs syndrome (RLS) is a sensorimotor sleep disorder whereby chronic exercise represents one of the most promising non-pharmacological approaches for managing symptoms, but some parameters of exercise (e.g., short-term high intensity) anecdotally exacerbate symptoms. This is the first study to systematically examine the effect of an acute exercise bout in adults with RLS.

Methods: Untreated, sedentary adults (N=12) with moderate-to-severe idiopathic RLS completed a submaximal cardiopulmonary exercise test to fatigue and maximal lower-extremity muscle strength testing. All participants completed the Self-Administered International Restless Legs Syndrome Study Group (sIRLS) Scale adapted for 24-hours daily for seven days starting two days before testing (pre) and continuing for five days post-testing, with primary outcomes being total score (range=0-40) and visual analogue scores (VAS; range=0-100).

Results: All participants were women; mean age=50 (range=24-70); mean baseline sIRLS=18 (range=11-25). Repeated-measures ANOVA indicated no statistically significant day-to-day difference

in sIRLS total scores ($F[4,40]=2.03$, $p=0.109$) or VAS scores ($F[4,40]=1.727$, $p=0.163$) across the seven-day period. The night immediately after acute exercise did not differ significantly from pre-exercise for average sIRLS (mean diff=-2.17; $p=0.057$) or VAS scores (mean diff=-6.8; $p=0.222$). Individual responses varied, whereby three (25%) participants reported an increase in symptoms (all < 3 points), while nine (75%) reported reductions, with three (25%) reporting >3 point change (delta range -5 to -11), surpassing the minimal clinically significant change for this scale. For VAS, four (33%) participants reported an increase (delta range= 2 to 16) and seven (58%) reported a reduction in symptoms (delta range=-2 to -51).

Conclusion: These preliminary results did not produce statistically significant day-to-day changes in RLS severity following acute, high-intensity exercise. A partial eta-squared of 0.17 suggests a medium-to-large effect size, implying a potentially meaningful pattern that the study was underpowered to detect. Inter-individual variability immediately post-exercise aligns with our prior work. Long-term effects of exercise remain to be studied.

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0803

WITHDRAWN FROM PUBLICATION

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0804

BLOOD LIPIDS MODERATE THE ASSOCIATIONS BETWEEN THE PROPORTIONS OF SPECIFIC SLEEP STAGE DURATIONS AND INHIBITORY CONTROL IN OLDER BLACK ADULTSBrittany Larsen¹, Debbie Chung¹, Alberto Ramos², Omonigho Bubu³, Ricardo Osorio³, Girardin Jean-Louis¹, Azizi Seixas¹¹University of Miami, ²University of Miami School of Medicine,³NYU Grossman School of Medicine

Introduction: Sleep disturbances impact cognitive performance. Each sleep stage may uniquely impact different cognitive functions, but findings have been inconsistent. Cardiovascular disease (CVD) influences sleep and cognition, particularly executive function; yet, whether cardiovascular risk moderates sleep durations and executive function remains unclear. Therefore, we tested if CVD risk biomarkers moderated sleep stage durations/percentages and executive function in older Blacks, who are disproportionately affected by sleep disturbances and CVD.

Methods: Eighty-three Black adults, aged ≥ 55 years, participated in an eight-day-long observational study (NIA-funded MOSAIC study, $n=51$) or a six-month-long randomized controlled trial (NIA-funded PRAISE study, $n=32$). Data from both studies were harmonized in accordance with a standardized protocol. At the baseline visit, fasting serum cardiovascular risk biomarkers (total cholesterol, high-density lipoproteins (HDL)) were collected and quantified, from which total cholesterol:HDL ratios (TC:HDL-c) were calculated. Each participant was instructed to wear a Fitbit Inspire 2 wrist-worn device at least 4 consecutive days; thereafter, averaged durations/percent durations of each sleep stage were obtained from the Fitbit device. Executive function was characterized using the Dimensional Change Card Sort (DCCS, which tested cognitive flexibility) and Flanker (which tested inhibitory control) tasks in NIH Toolbox. An age-/education-adjusted T-score value was generated from each neurocognitive task. Hierarchical moderated regression analysis tested whether cardiovascular risk markers moderated the associations between sleep architecture durations/percentages and executive function in older Black adults.

Results: %N1/%N2, %REM, and TC:HDL-c were each independently associated with Flanker T-scores ($p's < 0.0071$). The interactions between light non-REM percentages (%N1/%N2; $\Delta R^2=0.11$, $\Delta F=10.73$, $p=0.0016$) and %REM ($\Delta R^2=0.12$, $\Delta F=12.06$, $p=0.0008$) and TC:HDL-c were significant. Specifically, those with low TC:HDL-c ratios showed better inhibitory control performance when higher proportions of REM sleep and lower proportions of N1/N2 sleep were obtained, whereas the reverse was true in those with high TC:HDL-c ratios. In contrast, TC:HDL-c ratios did not moderate the links between sleep durations/percentages and DCCS T-scores.

Conclusion: The proportions of light non-REM and REM sleep durations, but not N3 or TST, were associated with inhibitory control performance, which varied by levels of cardiovascular risk in older Black adults. Future work should investigate these associations in other neurocognitive domains.

Support (if any): R01AG075007 (PRAISE); R01AG067523 (MOSAIC); T32HL166609

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0805

ALZHEIMER'S DISEASE BIOMARKERS MODERATE THE EFFECTS OF OBSTRUCTIVE SLEEP APNEA SEVERITY ON MEMORY IN COGNITIVELY UNIMPAIRED OLDER ADULTSJustin Liao¹, Abhishek Dave², Kate Sprecher³, Lui Kitty⁴, Henrik Zetterburg³, Brady Riedner³, Barbara Bendlin³, Ruth Benca², Bryce Mander¹¹University of California Irvine, School of Medicine, ²University of California, Irvine, ³University of Wisconsin School of Medicine,⁴San Diego State University

Introduction: Obstructive sleep apnea (OSA) is linked to memory decline and elevated Alzheimer's disease (AD) risk. Studies consistently show positive associations between sleep disturbances and AD biomarkers in preclinical cohorts, but it is unclear whether AD pathology alters how OSA severity impacts cognition. Here, we examined whether AD biomarkers in Cerebrospinal fluid (CSF) moderate associations between OSA severity and verbal memory.

Methods: Fifty-eight cognitively unimpaired older adults (61.4 ± 6.3 years, 38 females, 23 AHI ≥ 5) enriched for parental history of AD ($n=45$) and APOE4 positivity ($n=15$), and with no prior known history of OSA, underwent clinical polysomnography. Biomarkers were measured using exploratory RocheNeuroToolKit assays. Verbal memory was assessed with the Rey Auditory Verbal Learning Test (RAVLT). PROCESSv5.0 (model 1, SPSS) was used to examine moderating effects of phosphorylated tau-181 (p-tau), neurogranin, and α -synuclein on associations between OSA features (apnea-hypopnea index (AHI), respiratory-disturbance index (RDI), time with $< 90\%$ SpO₂) and RAVLT long delay recall performance, while adjusting for sex, age, time between assessments, education years, and body mass index (BMI). P-tau and neurogranin were logarithmically transformed and the reciprocal of α -synuclein was used to maintain normality, and False Discovery Rate (FDR) was implemented for multiple comparisons correction.

Results: Higher p-tau, neurogranin, and α -synuclein each moderate the association between greater OSA severity and worse long delay recall. Moderations were significant for AHI (p-tau $b=-14.3$, $p < 0.05$; neurogranin $b=-10.2$, $p < 0.05$; α -synuclein $b=2924.1$, $p < 0.05$), RDI (p-tau $b=-20.1$, $p < 0.01$; neurogranin $b=-11.3$, $p < 0.05$; α -synuclein $b=3263.1$, $p < 0.05$), and time $< 90\%$ SpO₂ (p-tau $b=-15.9$, $p < 0.01$; neurogranin $b=-12.4$, $p < 0.01$; α -synuclein $b=3550.1$, $p < 0.01$) relationships with RAVLT long delay recall.

Conclusion: These findings showed that the negative consequences of OSA severity on verbal memory were observed particularly in those with elevated CSF levels of ptau and neurodegeneration markers. These biomarkers may thus help identify those that are more vulnerable to OSA-related memory impairment in the preclinical stage.

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0806

SLEEP INERTIA, DAYTIME SLEEPINESS, AND FALLS IN OLDER ADULTS OF THE WISCONSIN SLEEP COHORTJesse Cook¹, Jodi Barnett², Jessica Love², Erika Hagen², Paul Peppard², David Plante³¹University of Wisconsin-Madison, School of Medicine and Public Health, Department of Psychiatry, ²University of Wisconsin-Madison, ³Department of Psychiatry, University of Wisconsin-Madison

Introduction: Falls constitute a serious health concern in older adults, representing the leading cause of injury-related death. Identifying modifiable risk factors is key to mitigating and managing falls in older adults. Excessive sleep inertia (ESI) and daytime sleepiness (EDS) are known safety hazards that could plausibly heighten fall risk in older adults. However, sleep inertia and daytime sleepiness are understudied in the context of fall risk. This study examined the relationships between sleep inertia, daytime sleepiness, and falls in older adults of the Wisconsin Sleep Cohort (WSC).

Methods: Data from older adults without shift-worker history in the WSC were utilized. The Sleep Inertia Questionnaire (SIQ) and Epworth Sleepiness Scale (ESS) measured sleep inertia and daytime sleepiness severity, respectively. SIQ and ESS were dichotomized. ESI was defined by the upper quartile (SIQ > 36), while EDS was defined using an established severity threshold (ESS > 10). Participants self-reported the number of falls (Falls-Number) over the past year, and whether they experienced any fall-related injuries (Falls-Injury). Falls-Number (< 3 vs. 3+ falls) and Falls-Injury (no vs. yes) served as outcomes in analyses. Logistic regressions were performed, with adjusted models accounting for age, sex, body mass index, chronotype, habitual sleep duration, arthritis history, alcohol use, caffeine use, smoking history, depressive symptomatology, and anxiety symptomatology.

Results: 403 older adults (mean age = 74.4 ± 6.74 years; 44.4% female) comprised the analytic sample. In adjusted analyses, ESI, but not EDS, significantly associated with a higher likelihood of falls (Odds Ratio [OR] = 3.44, 95% Confidence Interval [CI] = [1.51, 7.86], p = 0.003). Both ESI (OR = 2.11, 95% CI = [1.12, 3.95], p = 0.02) and EDS (OR = 2.19, 95% CI = [1.13, 4.17], p = 0.02) significantly associated with a greater likelihood of having a fall-related injury in adjusted analyses.

Conclusion: ESI associated with increased likelihood of having more falls and fall-related injury, while EDS associated with increased likelihood of having a fall-related injury. Future research that uses objective measures to capture ESI and EDS is indicated.

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0807

ASSOCIATIONS BETWEEN ACCELEROMETRY-ASSESSED SLEEP PATTERNS AND HALLMARKS OF AGING IN THE UK BIOBANKRuiyi Liu¹, Jingsong Luo², Wangnan Cao³, Shengzhi Sun¹¹School of Public Health, Capital Medical University,²Department of Social Medicine and Health Education, School ofPublic Health, Peking University, ³School of Public Health, Peking University

Introduction: Sleep duration, efficiency, and irregularity are associated with increased risks of cardiovascular, neurodegenerative, and immune-related diseases, highlighting sleep as a multidimensional construct. Sleep plays an important role in regulating diverse biological processes and shapes immune and genomic processes with relevance to biological aging. Evidence suggests that sleep disturbances may accelerate biological aging by triggering cellular and molecular impairments. However, few studies have examined how multidimensional sleep patterns linked to cellular and metabolic hallmarks of aging.

Methods: We analyzed accelerometer-derived sleep data from the UK Biobank and extracted six sleep characteristics using a validated self-supervised deep neural network: total sleep duration, REM, deep sleep, light sleep, wake after sleep onset (WASO), and sleep irregularity (SD of daily sleep duration). K-means clustering identified multidimensional sleep patterns. Diagnoses of 83 age-related diseases (ICD-10) were mapped to nine hallmarks of aging: genomic instability, telomere attrition, epigenetic alterations, loss of proteostasis, deregulated nutrient sensing, mitochondrial dysfunction, cellular senescence, stem cell exhaustion and altered intercellular communication. Cox proportional hazards models estimated associations between sleep patterns, age-related diseases and aging hallmarks.

Results: Among 93,249 participants, three distinct sleep patterns were identified, including pattern 1 distinguished by higher WASO and light sleep; pattern 2 marked by adequate total sleep duration and lower sleep irregularity; pattern 3 characterized by elevated sleep irregularity. Compared with pattern 2, pattern 1 was associated with increased risks of 18 diseases (P-FDR < 0.05), most notably Parkinson's disease (HR = 2.40, 95% CI = 1.82 to 3.05) and immunodeficiency (HR = 1.96, 95% CI = 1.00 to 3.82). Pattern 3 was associated with 24 diseases (P-FDR < 0.05), particularly Parkinson's disease (HR = 1.93, 95% CI = 1.48 to 2.53) and dementia (HR = 1.67, 95% CI = 1.38 to 2.02). Both cluster 1 and cluster 3 linked to higher risk of hallmarks of aging except genomic stability (P-FDR < 0.001).

Conclusion: Our findings identified three distinct sleep patterns using accelerometry-derived metrics in a large population cohort, each showing different associations with aging. These results demonstrated the importance of multidimensional sleep assessment and provide a framework for targeted strategies to promote healthy aging.

Support (if any):

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0808

DREAM-MD (DEPRIVATION OF REST AND EFFECTS ON ATTENTION IN MEDICINE)—A SYSTEMATIC REVIEW OF U.S. PHYSICIANS

Brandon Lew, Brandon Tang, Anusuya Sen, Niall Baig, Eric Klein, Madhu Varma

California University of Science and Medicine

Introduction: Sleep deprivation impairs attention, memory, and executive function, creating serious risks for physicians making rapid, high-stakes decisions. Chronic sleep loss contributes to clinical errors, dysregulated stress pathways, inflammation, and burnout. Because long hours, overnight shifts, and unpredictable

schedules are common in U.S. healthcare, insufficient sleep has become normalized, undermining both physician well-being and patient safety. We hypothesize that chronic sleep deficiency in U.S. physicians leads to measurable declines in cognitive performance and safety, influenced by institutional factors such as staffing and workplace culture.

Methods: A PubMed search using “sleep deprivation, physicians or doctors, U.S.” identified 284,453 articles. Restricting results to full clinical research—excluding abstracts, reviews, conference summaries, and non-peer-reviewed content—in English from 2020–2025 yielded 6,461 studies. Titles, abstracts, and full texts were screened using standardized criteria, excluding studies that did not explicitly measure sleep. Thirteen studies met inclusion criteria, and handsearching identified two additional full-text articles, for a total of 15.

Results: Across these studies, 34,049 U.S. physicians (~19,500 trainees and ~14,500 attendings) across internal medicine, pediatrics, surgery, anesthesiology, emergency medicine, neurology, and primary care from ≥96 institutions were represented. Study designs included 8 randomized or cluster-randomized trials, 1 national cohort, 1 pre-post intervention, and 5 cross-sectional studies. Sleep deprivation was measured using 24–28-hour shifts, the monthly frequency of such shifts (reduced from 3.9 to 0.2), < 4 hours of sleep on call, and validated sleep-impairment scales capturing acute and chronic fatigue. All five studies studying cognition reported measurable impairment, including 51-point declines in vigilance and >100% increases in attentional lapses. Burnout worsened in all 10 studies assessing the outcome, while interventions such as coaching, mindfulness, and physiological feedback produced improvements (e.g., 30.1% reduction in interpersonal disengagement). Safety outcomes showed >40% fewer percutaneous injuries after duty-hour reforms and significantly fewer serious PICU medical errors under ≤16-hour shifts.

Conclusion: Chronic sleep deprivation consistently reduces physician cognitive performance, increases burnout, and elevates medical errors. Risks peak during extended shifts, whereas system-level scheduling reforms offer the strongest protective effects.

Support (if any): None

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0809

HORMONAL CONTRACEPTIVES AND WOMEN'S SLEEP HEALTH: A SYSTEMATIC REVIEW

Kathryn Kennedy¹, Julia Boyle², Alexandria Muench³, Michelle Thompson⁴, Jessica Meers⁵, Emily Arentson-Lantz⁶, Elizabeth Kline¹, Knashawn Morales⁷, Sammy Dhaliwal⁷, Sara Nowakowski⁵

¹University of Arizona, ²Harvard Medical School, ³Penn Medicine Princeton Health, ⁴Lehigh University, ⁵Baylor College of Medicine, ⁶University of Texas Medical Branch, ⁷University of Pennsylvania

Introduction: Sex hormones and hormonal contraceptives influence the regulation of sleep-wake behavior. However, there are very few large-scale studies to date that have comprehensively evaluated how hormonal contraceptives influence women's sleep health. The purpose of this systematic review was to synthesize the existing research on hormonal contraceptive use and sleep in women ages 18–50.

Methods: The systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement checklist. Searches were conducted

in PubMed, Embase, CINAHL, PsycINFO, Scopus, Cochrane Central Register of Controlled Trials, Global Index Medicus, ProQuest Theses and Dissertations, and ClinicalTrials.gov beginning from the earliest publication data available until September 2024. Of 8,090 articles that were eligible for screening, 13 studies were included in this review. Data were extracted and evaluated for risk of bias and heterogeneity.

Results: The included studies demonstrated high heterogeneity in terms of objective and/or subjective sleep-related measures, as well as non-sleep primary study outcomes, thus precluding the ability to conduct a meta-analysis. Significant risk of bias concerns were also identified. A majority of the studies were conducted on health adults (85%) using cross-sectional data (54%) with participants using the combined pill (31%) or contraceptive formulas that were not specified (31%). Over half the studies did not report significant differences between groups regarding objective (e.g., sleep efficiency) or subjective (e.g., Pittsburgh Sleep Quality Index) sleep data.

Conclusion: While these findings underscore the need for methodological consistency in assessing women's sleep health, several clinical guidelines can be gleaned from this existing research in terms of the behavioral assessment and treatment of sleep difficulties in women using hormonal contraceptives. For example, it may be useful to assess and track menstrual phase alongside sleep for the purposes of tailoring or modifying behavioral interventions. Additional investigation is needed to identify standardized research and clinical methodology guidelines for assessing and treating women's sleep health.

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0810

OBJECTIVE AND SUBJECTIVE SLEEP CHARACTERISTICS IN WOMEN WITH ENDOMETRIOSIS: A PILOT STUDY

Raegan Atha¹, Christa Coleman², Kaylee Rice², Kristina Lenker², Julio Fernandez-Mendoza³

¹Penn State Health Sleep Research & Treatment Center, ²Penn State College of Medicine, ³Penn State University, Hershey

Introduction: Endometriosis is a chronic gynecological disorder that affects 10% of women of reproductive age, associated with pain, fatigue, and diminished quality of life. Over 70% of women with endometriosis experience significant sleep difficulties, such as poor sleep quality, insomnia, and daytime sleepiness. Despite the high prevalence of these sleep difficulties, few studies have examined both objective (e.g., actigraphy) and subjective (e.g., sleep diaries) sleep parameters prospectively in this population.

Methods: Nine women 32.5 (7.0) years old were recruited as part of a pilot study assessing the feasibility and acceptability of mindfulness-based intervention for endometriosis surgery. All participants had a probable or confirmed diagnosis of endometriosis, making them candidates for surgery. Participants wore an actigraphy device (wGt3X-BT) and completed consensus sleep diaries for at least 14 consecutive days. We examined bedtime, waketime, sleep midpoint, sleep onset latency (SOL), number of awakenings, wake after sleep onset (WASO), total sleep time (TST), time in bed (TIB), and sleep efficiency (SE) in the 7 days prior to surgery.

Results: Actigraphy demonstrated an average bedtime at 21:22, rising time at 7:06, and sleep midpoint at 1:33, with normative SOL

(13.3±19.8 minutes) and TST (7.9±1.3 hours), yet increased awakenings (21.3±10.5), WASO (96.0±55.8 minutes) and TIB (9.7±1.4 hours), and decreased SE (81.5±8.7). Sleep diary was commensurate with bedtime (21:28), rising time (7:02), and TIB (9.6±1.6) actigraphy estimates, yet showed longer SOL (28.2±21.9), later sleep midpoint (2:03), less awakenings (3.5±3.1), longer WASO (70.6±77.1), shorter TST (7.0±1.5), and lower SE (61.5±29.9). Sleep diary captured that 9.1% of the days had at least one nap and 33.4% of the nights were rated as “poor” and 40.7% as “fair” sleep quality. Sleep medication use was minimal (1.8%).

Conclusion: Women with endometriosis demonstrated a high burden of disturbed sleep captured by both objective and subjective measures, underscoring sleep as a clinically relevant but often underrecognized component of the disease. Objective sleep alterations only partially overlapped with sleep self-reports, suggesting that both methods are essential in understanding sleep disruption in this population. These findings support the value of integrating multimodal sleep assessments into endometriosis research and care.

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0811

PREDICTING SLEEP EFFICIENCY FROM SELF-REPORTED OBSTRUCTIVE SLEEP APNEA SYMPTOMS IN POSTPARTUM WOMEN

Sara Lomba¹, Anna Quesada¹, Elijah Nichols¹, Nancy Hamilton¹, Teresa Lillis²

¹University of Kansas, ²Rush University Medical Center

Introduction: During the early postpartum period, women are at an increased risk of poor sleep quality, which can negatively impact maternal health and put early mothers at an increased risk for sleep disorders, which often go undiagnosed. Identifying risk factors is critical for screening and intervention strategies to mitigate potential long-term maternal health consequences. This study aimed to test a linear model to predict sleep efficiency and the presence of self-reported OSA symptoms.

Methods: A study was conducted with N=60 postpartum women between 3 and 6 months post-delivery. The Pittsburgh Sleep Quality Index (PSQI) was collected at baseline to gather sleep symptoms in the past month, and mothers in the study went on to collect one week of actigraphy data. The PSQI question 5e, which assesses sleep disturbance as a product of coughing and snoring loudly, was used to assess risk for potential OSA symptoms in our sample. Sleep efficiency was measured via 7-day actigraphy, and average score was analyzed. Multiple linear regression was used to determine the predictive strength and significance of the relationship.

Results: Actigraphy-measured Sleep efficiency was regressed on self-reported measures of coughing and snoring loudly (PSQI 5e). Coughing and snoring were significantly related to Sleep Efficiency, $\beta = -0.44$, 95% CI [-0.68, -0.20], $p < 0.001$. We followed up by examining Sleep Efficiency at each level of Sleep Disturbance. Sleep Efficiency for postpartum moms who reported no coughing or snoring was 79.7, 95% CI [76.69, 82.77], SD = 7.1, which was significantly higher than for those who reported coughing or snoring less than once a week 65.7, 95% CI [58.84, 72.96], SD = 5.9, and for those who reported coughing or snoring once or twice a week was 52.6, 95% CI [37.87, 66.26], SD = 4.7.

Conclusion: This model identified that higher self-reported sleep disruptions due to coughing or snoring loudly predicted lower actigraphy-derived sleep efficiency. These findings support the use of the PSQI in identifying women at risk for lower sleep quality in the postpartum period, and support further research into better understanding maternal sleep in the postpartum period and how this may relate to overall health.

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0812

SLEEP HEALTH CHANGES IN TRANSGENDER ADULTS INITIATING GENDER-AFFIRMING HORMONE THERAPY: A SYSTEMATIC REVIEW

Jor Grapentine, Spencer MacLellan, Sam Reed, Jessica Dietch
Oregon State University

Introduction: Transgender and gender diverse (TGD) adults are at elevated risk of poor sleep health. Gender-affirming hormone therapy (GAHT) is widely used to relieve gender dysphoria and increase quality of life in this population. Hormone-driven changes in thermoregulation, mood, and stress may plausibly either improve or disrupt sleep. However, the relationship between GAHT and sleep health has not been systematically reviewed. This review synthesizes evidence on how GAHT initiation influences sleep health in TGD adults. However, the relationship between GAHT and sleep health has not been systematically reviewed. We synthesized the evidence on GAHT initiation and sleep health in TGD adults and followed PRISMA guidelines.

Methods: Three reviewers systematically searched three databases (PubMed, PsycINFO, Web of Science) in January 2025. The search was limited to prospective studies of GAHT initiation in TGD adults that included sleep health outcomes (i.e., regularity, duration, quality, alertness, timing, and efficiency) and included at least one follow-up. We assessed risk of bias with the ROBINS-I and synthesized results by hormone type (i.e., testosterone or estrogen/anti-androgens) and sleep health outcome.

Results: Nine of 957 screened articles met inclusion criteria, representing samples of 6–262 TGD adults initiating GAHT. Follow-ups ranged from 3 to 12 months. Sleep outcomes included total sleep time, sleep efficiency, sleep onset latency, wake after sleep onset, sleep architecture, insomnia, fatigue, and chronotype. Outcomes assessed using polysomnography (n=1), EEG or single-channel EEG (n=2), and validated (n=3) or unvalidated (n=3) self-report measures. Initiating estrogen/anti-androgen was associated with modest increases in EEG-derived N1 sleep. Initiating testosterone was associated with temporary increases in fatigue at 3 months that returned to baseline by 9 and 12 months. Risk of bias ranged from moderate (n=1) to critical (n=8) due to the use of unvalidated measures and inadequate control of confounding variables.

Conclusion: Most observed changes in sleep health were small and not clinically significant. The use of overlapping datasets, measurement variability, and a high risk of bias across studies limit the ability to draw clear conclusions about GAHT's effects on sleep health. Larger studies that address extraneous variables are needed to clarify these relationships.

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0813

COGNITIVE FAILURES PREDICT AUTHORITARIAN PARENTING IN GRANDPARENTS: THE MEDIATING ROLE OF SLEEP QUALITYBrielle Distler, Aurora Baldwin, Christina McCrae, Melanie Stearns
University of South Florida

Introduction: Cognitive failures (i.e., lapses in attention, memory, or action) undermine self-regulation and emotional control, both essential for positive caregiving. Poor sleep similarly impairs these capacities, affecting stability and impulse control. Because cognitive functioning and sleep decline with age and caregiving stress, grandparents raising grandchildren may be especially vulnerable to self-regulatory challenges that heighten negative parenting. This study tested whether sleep quality mediated the link between cognitive failures and parenting practices.

Methods: Grandparents (N=185, Mage=54.31, 79.8%-female) who reported living with and being responsible for the care of their grandchildren (Mage=8.05, 49.4%-female) completed the Cognitive Failures Questionnaire and the Pittsburgh Sleep Quality Index. They also completed the Parenting Styles & Dimensions Questionnaire - Short Version, which has 3 main scales: authoritative (connection, autonomy granting, regulation, authoritarian (physical coercion, verbal hostility, nonreasoning), and permissive parenting and subscales within the first two scales. SPSS PROCESS conducted mediation analyses, controlling for grandparent age and sex.

Results: Grandparents (N=185, Mage=54.31, 79.8%-female) who reported living with and being responsible for the care of their grandchildren (Mage=8.05, 49.4%-female) completed the Cognitive Failures Questionnaire and the Pittsburgh Sleep Quality Index. They also completed the Parenting Styles & Dimensions Questionnaire - Short Version, which has 3 main scales: authoritative (connection, autonomy granting, regulation, authoritarian (physical coercion, verbal hostility, nonreasoning), and permissive parenting and subscales within the first two scales. SPSS PROCESS conducted mediation analyses, controlling for grandparent age and sex.

Conclusion: Results suggested that poor sleep quality may be a potential mechanism that helps explain the relationship between increased cognitive failures and negative parenting behaviors in grandparents raising grandchildren. Future research should examine these pathways longitudinally to clarify causal relationships and explore whether interventions targeting sleep improvement can reduce negative parenting practices in caregiving grandparents.

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0814

GENDER-AND AGE-BASED DIFFERENCES IN SLEEP DISORDER RISK: INSIGHTS FROM THE MOBILE APPLICATION SLEEP BY CLEVELAND CLINICDina Ali¹, James Bena², Marybelle Reyes²,Sikawat Thanaviratananich², Nancy Foldvary-Schaefer³¹Cleveland Clinic Foundation, ²Cleveland Clinic, ³Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Health disparities are recognized in sleep medicine, but longitudinal observations are limited. Digital tools provide scalable methods to assess risk. SLEEP by Cleveland Clinic is a mobile application using evidence-based tools to screen adults for common sleep disorders. We analyzed user-reported data to evaluate risks of OSA, insomnia, and abnormal sleep duration by sex and age.

Methods: Data from October 2019 through November 2025 were included with 52% of downloads occurring in 2025. Age was categorized into: 18-39, 40-49, 50-59, 60-69, ≥70. High risk OSA (HR-OSA; AHI >15), was assessed by the Cleveland Clinic Sleep Apnea Probability Score (Katzan IL, 2016) and insomnia symptom severity by the Insomnia Severity Index (ISI). Sleep duration was classified as normal (7-9h) or abnormal (< 7h and >9h). Risk changes was evaluated with linear and logistic regression models incorporating sex-specific variances and a time-by-gender interaction (time=month of download).

Results: The sample was comprised of 11,944 users (mean age 58(16)y, 67.6% female, 86% White). Females with older (59(16) vs 57(16)y, p=0.001) and more likely to be White (89 vs 81%, p< 0.001). Median (IQR) HR-OSA probability was lower in females (25(10,42) vs 49 (21,71)%, p< 0.001), consistently increasing with age: 18-39y (3 vs. 10), 40-49y (9 vs 23), 50-59y (18 vs 47), 60-69y (31 vs 63), ≥70y (48 vs 79), p< 0.001. Median (IQR) ISI was higher in females (16(12,20) vs 14(10¹, 9), p< 0.001), and across all age groups except 60-69y: 18-39y (16 vs 14), 40-49y (15 vs 14), 50-59 (16 vs 14), ≥70y (16 vs 15), suggesting stable, prolonged symptoms in both groups (p< 0.001). Abnormal sleep duration was greater in females overall (39.1 vs 32%, p< 0.001) and across all age groups except 18-39y and 60-69y: 40-49y (34 vs 27%), 50-59y (36 vs 28%), ≥70y (44 vs 39%), p< 0.001. Short and long sleep was observed in 9.1 and 30% of females and 12 and 22% of males, respectively.

Conclusion: These results highlight sex- and age-specific differences in sleep disorder risk and demonstrate the potential of large-scale digital health data to elucidate population-based sleep health disparities that may increase awareness and improve early detection and treatment.

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0815

IDENTIFYING SLEEP ASSOCIATIONS IN WOMEN ACROSS FIVE COUNTRIES: A GLOBAL SMARTWATCH-BASED STUDYClaudio Soares¹, Fiona Baker², Pauline Maki³, Jungwon Lee⁴, Minsoeng Kim⁴, Donghyun Lee⁴, Ricky Choi⁵, Jongmin Choi⁴, Hon Pak⁴, Nils Schoof⁶, Julie Dorey⁷, Elaina Bolinger⁶, Cecilia caetano⁸, Carsten Moeller⁶, Carina Dinkel-Keuthage⁶¹Queen's University, ²SRI International, ³University of Illinois Chicago, ⁴Samsung Electronics, ⁵Samsung Electronics America, ⁶Bayer AG, ⁷Bayer Healthcare SAS, ⁸Bayer Consumer Care AG, Basel, Switzerland

Introduction: Sleep disturbances are common among midlife women. Wearables offer a novel, scalable approach to study sleep globally. Using Samsung Galaxy Watch data, we examined associations of age, weekdays/weekends, physical activity, and country with sleep parameters in an international cohort of women.

Methods: We analyzed sleep data from 192,500 women (aged 20-65 years) from France, Germany, South Korea, the UK, and the US (n=38,500/country). Sleep parameters included total sleep period duration (TSPD), total sleep time (TST), and wake after sleep

onset (WASO; log-transformed). Linear mixed models assessed associations with age, weekdays/weekends, physical activity, and country (reference: US). An exploratory model included age-by-country interactions.

Results: Mean (standard deviation) values were: TSPD 439.4 (92.0) minutes, TST 391.2 (81.9) minutes, and WASO 48.3 (33.5) minutes. Age distributions were comparable across countries, with ~1/3 of women aged ≥ 50 years. Weekend nights were associated with ~24 minutes longer TSPD (+5.4%). Age and physical activity effects were small (± 5 minutes). Women in South Korea had the shortest TSPD, averaging 27 minutes less (−6.2%) than US women. TST declined with age, with women aged ≥ 50 sleeping 13–17 minutes less (−3.3% to −4.4%) than those aged 20–24. Weekend nights were associated with ~21 minutes longer TST (+5.3%) than weeknights. Activity-related differences were small (< 3 minutes; $< 1\%$). Women in South Korea averaged a 25-minute shorter TST (−6.3%) versus US women. WASO increased with age; women aged ≥ 50 had 5–11 minutes more wakefulness (+15–32%) than those aged 20–24. Effects were small for weekend (+2 minutes; +5.4%), activity (< 1 minutes; −1.1% to −2.5%) and country (UK: +1.5 minutes; South Korea: −1 minute versus US). Age-related WASO increases were consistent across countries, except South Korea where interaction effects were greater.

Conclusion: Results demonstrated country-specific differences in TST and TSPD and age-related effects on TST and WASO, with differences evident in women aged ≥ 50 , consistent with the menopausal transition. Smartwatch data provides large-scale sleep research potential to understand unique factors influencing sleep in women.

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0816

IDENTIFYING TIME IN BED WITH CHEST-WORN ACCELEROMETRY

Keran Chamberlin¹, Lacey Etzkorn², Kening Jiang³, Adam Spira³, Lin Yee Chen⁴, Ciprian Crainiceanu², Vadim Zipunnikov⁵, Jennifer Schrack¹

¹Department of Epidemiology, Johns Hopkins University,

²Department of Biostatistics, Johns Hopkins University,

³Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, ⁴University of Minnesota Medical School,

⁵Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health

Introduction: Chest-worn accelerometers can capture both acceleration and posture, but their use in detecting and measuring time in bed (TIB) has been limited. We investigated whether TIB can be estimated from chest-worn accelerometers using both acceleration and posture data without using sleep diary information.

Methods: We developed a method to classify TIB using data from the Zio XT Patch (iRhythm, San Francisco, CA, USA) onboard accelerometer in the Atherosclerosis Risk in Communities (ARIC) Study. The method was optimized by maximizing its F1 score using minute level data relative to the in-bed status which was estimated from simultaneously collected hip-worn actigraphy data using a published method among ARIC participants ($n=405$, age 78.5 ± 4.7 years). The method was then used to estimate whether a person was in or out of bed among all ARIC participants ($n=2,470$, age 79.2 ± 4.6 years) and derived the average TIB, TIB

midpoint, and the standard deviation of TIB midpoint across days. To evaluate contextual validity of the new TIB summaries, we examined their cross-sectional associations with demographic and clinical characteristics, and longitudinal associations with incident dementia.

Results: Participants contributed an average of 5.7 days (IQR: 5, 6.6) to the optimization process. The best algorithm had a F1 score of 0.843. Compared to the TIB estimated from the hip-worn device, TIB identified from the chest-worn device were on average 34.5 minutes shorter (95% CI: 28.4, 40.6), began 5.4 minutes earlier (95% CI: 0.3, 10.5), and ended 36 minutes earlier (95% CI: 32.9, 40.2). TIB was cross-sectionally associated with sex, race, comorbidities, and cognitive function. During a median 5.2 years (IQR: 4.5–5.7) of follow-up, 316 participants developed dementia. Compared to participants who spent a moderate amount of TIB (8.5 to < 9.75 hours/day), the cumulative incidence ratio for dementia was 1.61 (95% CI: 1.15, 2.27) for the lowest tertile and 1.37 (95% CI: 1.01, 1.85) for the highest tertile of TIB. An earlier in-bed midpoint and lower day-to-day variability in TIB midpoint were marginally associated with a reduced dementia incidence.

Conclusion: This study suggests that chest-worn accelerometers provide reasonable and useful estimates of TIB, opening a new opportunity for sleep assessment in older adults.

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0817

COMPLEMENTARY AND ALTERNATIVE MEDICINE THERAPIES IN RELATION TO IMPROVED SLEEP AMONG US ADULTS

Rupsha Singh¹, Symielle Gaston¹, Christopher Payne², Chandra Jackson¹

¹National Institute of Environmental Health Sciences, ²DLH Corporation

Introduction: Complementary and Alternative Medicine (CAM) therapies, such as massage and meditation, are widely used to promote wellness, including sleep improvement. Potential mechanisms include reduction of stress and physical discomfort. However, little is known about which CAM modalities support or strain sleep health.

Methods: With 2012 National Health Interview Survey data, we used Poisson regression with robust variance to estimate adjusted prevalence ratios (aPRs) and 95% confidence intervals (CIs) for associations between sixteen CAM therapies and short sleep duration (SSD). Participants also identified their top and up to three CAM therapies used for health and reported whether each therapy resulted in “better sleep” (‘yes’ or ‘no’). SSD was defined as < 7 hours versus 7–9 hours.

Results: Among 9,092 adults, age $\pm$ SE was 46.3 ± 0.25 years; most were non-Hispanic White (78.4%) and women (58%). Across the top three CAM therapies overall, 41.4% to 48.8% of participants perceived sleep improvement. The most prevalent therapies with reported “better sleep” included: mind-body or movement-based modalities, such as mantra/mindfulness/spiritual meditation (12.1%–18.3% vs. 3%–8.7%, $p < 0.001$), yoga/tai chi/qi gong (16.1%–33.9% vs. 8.6%–17.6%, $p < 0.001$), and massage (5.2%–17.7% vs. 2.3%–9.9%, $p < 0.001$ –0.006). However, herbal supplement use was more prevalent among those who did not report “better sleep” (12.5%–42.1% vs. 4.2%–14.4%, $p < 0.001$). SSD was more prevalent among adults using vs. not using massage

(aPR1stCAM=1.20, 95% CI: 1.07-1.34), herbal supplements (aPR1stCAM=1.08, 95% CI: 1.00-1.17; aPR2ndCAM=1.28, 95% CI: 1.11-1.48; aPR3rdCAM=1.25, 95% CI: 1.04-1.50), traditional healers (aPR2ndCAM=2.17, 95% CI: 1.65-2.85), and mantra/mindfulness/spiritual meditation (aPR3rdCAM=1.25, 95% CI: 1.02-1.54). Across CAM therapies, traditional healers (1st CAM), chiropractic manipulation (2nd & 3rd CAM), hypnosis (2nd CAM), yoga/tai chi/qi gong (2nd & 3rd CAM), and massage or movement/exercise techniques (3rd CAM) were associated with lower (albeit not statistically significant) SSD prevalence.

Conclusion: Although mind-body and movement-based therapies were more prevalent among adults reporting “better sleep,” we found – in adjusted models – massage, herbal supplements, traditional healer, and mantra/mindfulness/spiritual meditation were associated with higher SSD prevalence. Future studies should include all sleep dimensions and assess temporal ordering of and reasons for CAM use since it may reflect individuals seeking treatment for more severe sleep difficulties.

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0818

ELECTROCARDIOGRAPHIC AGE AND AMBULATORY BLOOD PRESSURE IN THE KOREAN GENOME AND EPIDEMIOLOGY STUDY

Nolberto Hernandez¹, Allyson Hughes¹, Ali Tanweer Siddiquee², Seung Ku Lee², Chol Shin², Nan Hee Kim², Robert Thomas¹, Honghuang Lin³

¹Beth Israel Deaconess Medical Center, ²Institute of Human Genomic Study, College of Medicine, Korea University,

³University of Massachusetts

Introduction: Deep learning–predicted electrocardiographic age (ECG-age), captures biological aging of the heart and predicts cardiovascular events beyond traditional risk factors. Whether ECG-age reflects 24-hour hemodynamic and autonomic burden, specifically ambulatory blood pressure (ABP) and heart rate (HR), remains unclear. Because ABP—especially nocturnal BP—is a strong marker of vascular and autonomic dysregulation, examining its relationship with ECG-age may clarify whether ECG-derived biological aging mirrors daily cardiovascular load.

Methods: We analyzed 781 adults (mean age 60 ± 7 years; 53.1% female) from the KoGES Ansan–Anseong cohort with valid resting ECGs and 24-hour ABP monitoring. ECG-age was estimated using a validated deep neural network trained on >1.5 million ECGs. The difference between ECG-age and chronological age (Δ age) was evaluated as a continuous measure and as decelerated vs accelerated aging groups. ABP was recorded every 30 minutes (daytime) and 60 minutes (nighttime). Mean 24-hour, daytime, and nighttime systolic (SBP) and diastolic BP (DBP), and HR were computed. Associations between ABP/HR and ECG-age were assessed using multivariable linear regression adjusting for age, sex, BMI, diabetes, and prevalent cardiovascular disease. Sensitivity analyses excluded participants with CVD.

Results: Higher ECG-age was significantly associated with elevated 24-hour ABP and HR. Each 1 mmHg increase in mean SBP corresponded to 0.038 years higher ECG-age (95% CI 0.009–0.067). Each 1 mmHg increase in mean DBP corresponded to 0.076 years higher ECG-age (95% CI 0.040–0.113). Associations were consistent across daytime and nighttime periods, with similar effect sizes.

Mean ambulatory HR was also positively associated with ECG-age (β = 0.070 years per bpm, 95% CI 0.033–0.108). In logistic models, DBP and HR significantly predicted accelerated aging status, whereas SBP did not. Sensitivity analyses excluding cardiovascular disease cases yielded comparable results, confirming robustness.

Conclusion: ECG-age, a deep learning–derived marker of electrophysiologic aging, is independently associated with higher 24-hour blood pressure and heart rate. These findings indicate that ECG-age reflects cumulative vascular and autonomic stress across the circadian cycle and may serve as a scalable biomarker of early cardiovascular aging relevant to sleep and cardiometabolic physiology.

Support (if any):

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0819

HIGH BURDEN OF SLEEP INSUFFICIENCY IN LATIN AMERICA AND ITS STRONG ASSOCIATION WITH SOCIAL VULNERABILITY

Fernando Ceballos-Fuentes¹, Lilliana Estrada-Chaverri², Lourdes DelRosso³

¹Neurology and Sleep Guatemalan Center, ²Sleep Med Sleep Disorders Medical Center, ³University of California San Francisco, Fresno

Introduction: Sleep insufficiency is a major public health concern linked to cardiometabolic disease, mental health disorders, and impaired daytime functioning. Data from Latin America remain limited. This study characterizes sleep duration patterns and quantifies the influence of social determinants of health (SDOH) on insufficient sleep in a large Central and Latin American cohort. **Methods:** A social media REDCap-based survey collected demographic, sleep, and SDOH data from adults across multiple Latin American countries. Sleep duration was categorized as < 5 hours, 5–6 hours, 7–8 hours, or ≥9 hours. Insufficient sleep was defined as < 7 hours per night. Prevalence estimates were stratified by age and sex. Logistic regression examined associations between individual SDOH variables and insufficient sleep. Odds ratios (ORs) with 95% confidence intervals (CIs) are reported.

Results: A total of 1,091 adults had complete sleep and SDOH data. Sleep insufficiency was highly prevalent: 65.5% (714/1,091) slept < 7 hours per night. Among respondents, 14.0% slept < 5 hours, 51.5% slept 5–6 hours, 31.3% achieved 7–8 hours, and 3.2% slept ≥9 hours. Insufficient sleep affected 60–70% of men and 50–80% of women, with the highest burden in adults aged 40–59 years. Multiple social determinants were significantly associated with insufficient sleep. The strongest predictors were: Money problems: OR 1.80 (1.34–2.43, p = 0.0001), transportation problems: OR 1.96 (1.05–3.68, p = 0.035) and Housing/neighborhood insecurity: OR 2.16 (1.03–4.54, p = 0.042) Other social barriers: OR 2.66 (95% CI: 2.02–3.51, p < 0.0001) Food insecurity showed elevated risk (OR 2.81, CI 0.96–8.26, p = 0.060), and lack of heating/AC trended toward significance (OR 1.66, CI 0.99–2.80, p = 0.057). Individuals reporting no social barriers had dramatically lower odds of insufficient sleep: OR 0.39 (0.30–0.50, p < 0.0001).

Conclusion: In this large regional survey, sleep insufficiency affects nearly two-thirds of adults in Latin America. Economic strain, transportation difficulties, neighborhood insecurity, and other social barriers significantly elevate the risk of short sleep.

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0820

HORMONAL CONTRACEPTIVE USE AND SLEEP IN WOMENDaniella Cristando¹, Emma Janes², Johana Jimenez², Ivan Vargas²¹University of Nevada, Reno, ²University of Notre Dame

Introduction: Women are two times more likely to report sleep difficulties than men, especially trouble falling or staying asleep, which can have significant negative effects on physical and mental health. Research in recent years has indicated that sex hormone fluctuations, particularly low levels of estrogen and progesterone, may be a contributing factor in the sleep difficulties experienced by women. Hormonal contraceptives, which frequently include synthetic variants of estrogen and progesterone, are intended to inhibit ovulation and regulate hormonal cycles but may also impact sleep, with studies showing altered sleep patterns, body temperature, and subjective sleep satisfaction in women who use hormonal contraceptives. This study aims to identify differences in sleep quality and insomnia between women who are naturally cycling and women who use hormonal contraceptives.

Methods: Data were collected from 590 young adult women (mean age = 30.5) via an online survey posted to Cloud Research Connect, a secure data collection platform. Participants were asked about menstrual health, hormonal and/or non-hormonal contraceptive usage, and sleep habits. Participants were also asked to complete the Insomnia Severity Index and Insomnia Symptom Questionnaire.

Results: There were no statistically significant differences between the hormonal contraceptive and naturally cycling groups with respect to ISI scores, $F(1,5) = 2.44$, $r = .004$, $p = .11$. A Chi-squares test was used to analyze ISQ scores between groups, there were no statistically significant differences, $\chi^2 = 0.002$, $p > 0.20$.

Conclusion: Overall, hormonal contraceptive users showed a small, but not statistically significant difference in insomnia scores compared to naturally cycling women. Based on our results, we failed to replicate previous research indicating that hormonal contraceptive use was related to sleep disturbance with respect to insomnia.

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0821

MATERNAL SLEEP IN PREGNANCIES COMPLICATED BY FETAL CONGENITAL HEART DISEASELouise O'Brien¹, Renée Shellhaas², Cynthia Ortinou²¹Michigan Medicine, ²Washington University in St. Louis

Introduction: Declining morbidity for children with congenital heart disease (CHD) has shifted efforts to understanding causes and improving long-term outcomes. While a genetic etiology is identified in ~25%, and other factors such as teratogens contribute a small percentage, the etiology is unknown for most patients. Fetuses with CHD have a 2-3-fold increased risk of

prematurity and maternal sleep disruption has been shown to be associated with adverse fetal outcomes including preterm birth and fetal growth restriction. Emerging data raise the possibility that maternal sleep may play a role in birth defects. We sought to investigate sleep during pregnancy in women whose fetuses were diagnosed with CHD, a common anatomical malformation impacting ~40,000 births/year in the United States.

Methods: Pregnant participants were recruited from an academic medical center and queried about their sleep including snoring, sleep duration, sleep quality and sleep midpoint. Sleep midpoint later than 04:00am was considered as circadian misalignment. Demographic and clinical information was abstracted from medical records.

Results: Fifty-one pregnancies with fetal CHD were compared to 1361 pregnancies without fetal CHD, with a mean gestational age of 33.9 ± 4.2 weeks at the time of survey administration. Women with a CHD pregnancy had a non-significant increase in Type 2 diabetes mellitus (6.3% vs. 3.4%; $p=0.29$) and gestational diabetes (15.7% vs. 8.3%; $p=0.29$), with no difference in pre-eclampsia (4.2% vs. 6.1%; $p=0.67$). There were no differences in the proportion of women with CHD fetuses who reported habitual snoring (35% vs. 35%; $p=0.89$) or poor sleep quality (63% vs. 71%; $p=0.2$) compared to women with non-CHD fetuses. However, women whose pregnancies were complicated by CHD had sleep midpoints that were later (~34 minutes) than women with typically developing fetuses (04:06am vs. 03:32am; $p=0.04$), despite the same sleep duration (8.5hrs vs. 8.5hrs). Notably, 40% of CHD pregnancies had delayed sleep midpoint compared to 29% of non-CHD pregnancies ($p=0.1$).

Conclusion: We hypothesize that delayed sleep timing, even when sleep duration is within normal limits, may be a risk factor for CHD. Mechanistic studies are required to investigate how altered circadian rhythms during development could trigger systemic changes that increase vulnerability to cardiac defects.

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0822

NOCTURNAL SLEEP DURATION, AFTERNOON SIESTA AND SLEEP DISTURBANCES IN YOUNG PREGNANT OMANI WOMEN AND RELATED OUTCOMES

Mohammed Al-Abri, Jalila Al-Mazroui, Sanjay Jaju, Nihal Al-Riyami Sultan Qaboos University

Introduction: Sleep disturbances are common in pregnancy and may influence both maternal health and fetal development. Nocturnal sleep duration, habitual daytime napping, and obstructive sleep apnea (OSA) are increasingly recognized as potential contributors to adverse pregnancy outcomes. However, their combined impact has not been fully characterized. Objective: To examine the associations between nocturnal sleep duration, afternoon napping habits, and OSA with key maternal and fetal outcomes during pregnancy.

Methods: This study investigated prospectively pregnant women receiving routine antenatal care. Nocturnal sleep duration and afternoon napping frequency were collected using actigraphy, and

OSA risk was assessed using home sleep apnea testing. Maternal outcomes of interest included gestational diabetes mellitus, hypertensive disorders of pregnancy, and mode of delivery. Fetal outcomes included birthweight, preterm birth, apgar score and neonatal complications. Multivariable models were used to evaluate associations while adjusting for relevant confounders.

Results: Total number of participants were 430 pregnant women (Age 18-35 years). Cross-tabulation analysis indicated that presence of OSA was found to be associated with gestational diabetes ($P=0.02$) and short nocturnal sleep duration (< 5 hrs) was also found to be associated with gestational diabetes ($P=0.03$). There were no other significant associations between sleep parameters and maternal or fetal outcomes ($P>0.05$)

Conclusion: Sleep duration and OSA each exhibit meaningful relationships with pregnancy health, mainly gestational diabetes. These findings highlight the importance of comprehensive sleep assessment in prenatal care and suggest that early identification of sleep disturbances may offer opportunities to improve both maternal and fetal outcomes.

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0823

PERCEIVED SLEEP IMPROVEMENT FROM COMPLEMENTARY AND ALTERNATIVE MEDICINE THERAPIES ACROSS RACIAL AND ETHNIC GROUPS

Rupsha Singh¹, Symielle Gaston¹, Christopher Payne², Chandra Jackson¹

¹National Institute of Environmental Health Sciences, ²DLH Corporation

Introduction: Complementary and Alternative Medicine (CAM) therapies, such as chiropractic manipulation and meditation, are widely used to support sleep health. For example, among U.S. adults with insomnia symptoms, approximately 45% report using at least one CAM therapy. Individuals often select CAM therapies that reflect cultural practices, accessibility, and personal beliefs. Although studies have documented variation in CAM utilization across racial and ethnic groups, few have assessed whether sleep-related benefits vary across these groups.

Methods: We investigated racial and ethnic differences in associations between CAM therapies and perceived sleep improvement using data from the 2012 National Health Interview Survey. Participants identified their top and up to three of the sixteen different CAM therapies used for health and reported whether each therapy resulted in "better sleep" ('yes' or 'no'). We used Poisson regression with robust variance to estimate prevalence ratios (aPRs) and 95% confidence intervals (CIs) for racial and ethnic differences in reporting perceived sleep improvement from CAM therapies, adjusting for sociodemographic and clinical characteristics.

Results: Among 9,092 adults, mean age $\pm$ SE was 46.3 ± 0.25 years; 58.2% were women; and 78.4% identified as non-Hispanic (NH)-White, 9.5% Hispanic/Latine, 7.8% NH-Black, 4.0% NH-Asian,

1.4% NH-multiracial/Other race, and 0.3% NH-American Indian/Alaska Native. Across groups, chiropractic/osteopathic manipulation was the most common most important CAM therapy. Across all CAM therapies tried (whether 1st or 3rd most important), perceived improvement in sleep ranged from 39.3% of NH-American Indian/Alaska Native adults to 57.4% of Hispanic/Latine adults. Compared with NH-White adults, Hispanic/Latine adults had higher prevalence of reporting sleep improvement across CAM therapies (aPR1stCAM=1.12, 95% CI:1.02-1.23; aPR2ndCAM=1.36, 95% CI:1.22-1.51; aPR3rdCAM=1.20, 95% CI:1.01-1.42). NH-Black adults, compared with NH-White adults, also had higher prevalence of sleep improvements across CAM therapies (aPR1stCAM=1.12, 95% CI:1.01-1.24; aPR2ndCAM=1.19, 95% CI:1.03-1.39). Potentially due to small sample sizes, there were no differences among the remaining racial and ethnic groups compared with NH-White adults.

Conclusion: Hispanic/Latine and NH-Black adults were more likely than NH-White adults to report sleep improvement from CAM therapies. Further research is warranted to determine which CAM practices offer the most effective sleep-related benefits overall as well as across racial and ethnic groups.

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0824

PUTTING A PRICE ON SLEEP: TWO DISTINCT WAYS PEOPLE VALUE SLEEP GAINS AND LOSSES

Bryce Beeton, Davis Paxton, Abigail Woolley, Brandon Pattillo, Dustin Sherriff-Clayton, Daniel Kay, Kara M. Duraccio
Brigham Young University

Introduction: Money is a central system for expressing value in modern society, extending even to health and life. We previously identified five broad factors of sleep value using the Sleep Value Item Bank (SVIB-2.0) —Wanting, Appreciating, Prioritizing, Preferring, and Devaluing—but how these relate to the monetary value of sleep remains unknown. Using a novel Monetary Sleep Value Questionnaire (MSQ), we examined how demographic and sleep-value factors relate to the monetary worth individuals assign to gaining or losing sleep.

Methods: This secondary analysis used data from the SRVIV survey study. Participants ($N=455$) across the continental US completed demographics questions (age: $M=45\pm17$; 53% female; 82% White; Education: $Mdn=some\ college$; 50% married), the SVIB-2.0, and the MSQ. The MSQ included eight self-report items assessing how much participants would need to be paid to lose increasing amounts of sleep and eight items assessing how much they would pay for increasing amounts of guaranteed sleep quality (each ranging from one hour to one hour nightly for life). Factor analysis evaluated the two proposed MSQ factors, and structural equation modeling tested their associations with demographics and the five SVIB-2.0 factors.

Results: Two factors were identified from the MSQ, which did not significantly correlate with one another. Factor 1, the amount one would need to be paid to sleep less, was associated with higher income, lower age, and more Sleep Devaluation ($p<.05$, for all). Factor 2, the amount one would pay for more sleep, was associated

with higher levels of Education, more Sleep Appreciation, and lower Sleep Devaluation ($p < .05$, for all).

Conclusion: Our results suggest that the MSQ captures two distinct valuation processes: sacrificing sleep for money and paying for quality sleep. Greater education and appreciation for sleep increase the value placed on quality sleep, whereas lower income, older age, and sleep devaluation predict trading sleep for money. Future research with the MSQ may help advance our understanding of sleep value as a potential target for sleep health promotion.

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0825

SEX-SPECIFIC ASSOCIATIONS BETWEEN APOLIPOPROTEIN EPSILON-4 ALLELE STATUS AND SLEEP PROPENSITY ON THE MULTIPLE SLEEP LATENCY TEST

Jesse Cook¹, Jessica Love², Jodi Barnet², Amanda Rasmuson², Emmanuel Mignot³, Paul Peppard², David Plante⁴

¹University of Wisconsin-Madison, School of Medicine and Public Health, Department of Psychiatry, ²University of Wisconsin-Madison, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine, ⁴Department of Psychiatry, University of Wisconsin-Madison

Introduction: The apolipoprotein epsilon-4 (APOE ϵ 4) allele is a key risk factor for sporadic Alzheimer's Disease. Women APOE ϵ 4 carriers are more likely to develop neurocognitive impairment than men, suggesting sex-specific effects of the allele on brain function. Since sleepiness has been associated with risk of cognitive decline, this study examined associations between objective sleep propensity quantified by the multiple sleep latency test (MSLT), APOE ϵ 4 status, and sex in a population-based sample.

Methods: 1,028 individual MSLTs performed in 723 participants in the Wisconsin Sleep Cohort (WSC) study (age 60.4 $\pm$ 8 years; 48% female) were utilized. Mixed linear models with repeated observations were utilized to test associations between MSLT mean sleep latency (outcome), APOE ϵ 4 status (modeled ordinally as 0, 1 or 2 ϵ 4 alleles), and sex*APOE ϵ 4 interactions, with additional covariates (age, body mass index, antidepressant use, sedative use, stimulant use, caffeine/nicotine prior to MSLT naps, circadian preference, and apnea-hypopnea index) included in models.

Results: In fully adjusted models, a significant sex*APOE ϵ 4 interaction was observed ($p=0.012$). Fully adjusted analyses stratified by sex demonstrated a significant association of APOE ϵ 4 with mean sleep latency in men ($\beta=-1.32$ minutes/per APOE ϵ 4 allele), $p < 0.001$, that was not observed in women ($\beta=0.067$, $p=0.89$).

Conclusion: APOE ϵ 4 is associated with significantly reduced mean sleep latency on the MSLT among men participating in the WSC. Further research is indicated to determine if this observation extends to younger age groups or central disorders of hypersomnolence.

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0826

SLEEP DURATION AND SHORT SLEEP DISPARITIES AMONG TRANSGENDER ADULTS: A NATIONALLY REPRESENTATIVE ANALYSIS OF BRFSS 2022

Emory Steelman¹, Lourdes DelRosso²

¹University of California San Francisco, Fresno, ²University of California San Francisco

Introduction: Sexual and gender minority populations experience stress, discrimination, and barriers to healthcare access yet data on sleep duration is limited. We analyzed the 2022 Behavioral Risk Factor Surveillance System (BRFSS) to compare sleep duration and short sleep prevalence across transgender female-to-male (Trans F-to-M), transgender male-to-female (Trans M-to-F), gender non-conforming, and non-transgender adults, and to evaluate whether differences persisted after adjustment for age.

Methods: Cross-sectional analysis of 2022 BRFSS data was analyzed using R version 4.5.1 and the survey package to account for complex sampling design. Sleep duration was assessed using SLEPTIM1 and short sleep was defined as < 7 hours. Gender identity (TRNSGNDR) was categorized as gender non-conforming, Trans F-to-M, Trans M-to-F, or not transgender (reference). Short sleep prevalence and standard errors were estimated and regression with age modeled. Odds ratios (OR) and 95% confidence intervals (CI) were calculated from exponentiated model coefficients.

Results: Data includes 436,194 adults, of whom 0.19% (≈ 499) identified as gender non-conforming, 0.20% (≈ 515) as Trans F-to-M, and 0.22% (≈ 589) as Trans M-to-F, while 97.9% ($\approx 430,000$) reported not being transgender. Weighted mean sleep duration was 6.74 $\pm$ 0.18 hours among Trans F-to-M adults, 6.89 $\pm$ 0.15 hours among Trans M-to-F adults, 7.00 $\pm$ 0.16 hours among gender non-conforming individuals, and 6.95 $\pm$ 0.01 hours among non-transgender adults. Short sleep prevalence was highest among Trans F-to-M adults (46.1%, SE 3.97%), followed by gender non-conforming (40.0%, SE 3.32%) and Trans M-to-F adults (39.7%, SE 4.26%), compared with 35.7% (SE 0.20%) among non-transgender adults. In age-adjusted models, Trans F-to-M adults had significantly higher odds of short sleep (OR 1.52; 95% CI 1.11–2.08; $p = 0.009$), whereas gender non-conforming (OR 1.19; 95% CI 0.90–1.57) and Trans M-to-F adults (OR 1.16; 95% CI 0.80–1.67) were not statistically different. Short sleep increased across early and mid-adulthood, peaking at ages 30–64 (OR range 1.27–1.40, all $p < 0.001$), and declined after age ≥ 65 .

Conclusion: Transgender female-to-male adults experience a significantly higher burden of short sleep independent of age, while other transgender identity groups demonstrate sleep patterns similar to non-transgender adults.

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0827

SLEEP HEALTH TRAJECTORIES ACROSS PREGNANCY AND THEIR ASSOCIATION WITH ADVERSE PREGNANCY OUTCOMES: THE PREGNANCY 24/7 COHORT STUDY

Christopher Kline¹, Jaemyung Kim², Janet Catov¹, Maisa Feghali¹, Donna Santillan², Mark Santillan², Iqra Sheikh³, Bridget Zimmerman², Bethany Barone Gibbs³, Kara Whitaker²

¹University of Pittsburgh, ²University of Iowa, ³West Virginia University

Introduction: Poor sleep has been associated with adverse pregnancy outcomes (APOs), but prior research has been limited to examination of single sleep dimensions and/or assessment of sleep at a single timepoint. The purpose of this study was to examine the trajectories of three sleep health dimensions (duration, efficiency, quality) across pregnancy and their association with APOs.

Methods: The Pregnancy 24/7 cohort study followed a sample of 500 pregnant women from three sites (Iowa City, Iowa; Pittsburgh, Pennsylvania; Morgantown, West Virginia). Sleep was assessed at each trimester using actigraphy and validated questionnaires; APOs (hypertensive disorders of pregnancy [HDP], preterm birth, gestational diabetes, and small-for-gestational age) were abstracted from medical records and adjudicated by an obstetrician at each site. Group-based trajectories of sleep duration and efficiency (based on ~7 nights of total sleep time and sleep efficiency [SE], respectively) and quality (single item from the Pittsburgh Sleep Quality Index) were constructed. Binary logistic regression models evaluated associations between the three sleep health dimension trajectories and APOs (composite of all APOs, HDP), with covariate adjustment for site, age, pre-pregnancy body mass index, socioeconomic status, number of children in the home, and minority status.

Results: Participants with available sleep and APO data (n=478) were, on average, 30.6±4.5 years old; 87.2% were White race, and 22.6% were rural. APOs occurred in 36.8% of participants, with 18.2% specifically developing HDP. Four trajectory groups were identified for duration (representing short, medium, medium-long, and long sleep duration), four groups for efficiency (representing low, low-moderate, high, and very high SE), and two groups for quality (poor, good). None of the sleep health trajectories were significantly associated with the likelihood of either APO or HDP, with efficiency showing the most prominent (albeit nonsignificant) associations (e.g., for APO: relative to low SE, adjusted odds ratios for low-moderate SE, high SE, and very high SE were 0.64 [0.32,1.28], 0.66 [0.33,1.32], and 0.66 [0.31,1.38]).

Conclusion: Our findings failed to observe an association between trajectories of sleep duration, efficiency, or quality with APOs. Future work will explore the potential influence of additional sleep health dimensions and trimester-specific associations with APOs.

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0828

ASSOCIATIONS BETWEEN 24-HOUR MOVEMENT BEHAVIOR GUIDELINE ADHERENCE AND METABOLIC SYNDROME IN POSTMENOPAUSAL WOMEN FROM THE SWAN STUDY

Rachel Sanders¹, Kara Whitaker², Sharon Taverno Ross³, Sanjay Patel⁴, Kelliann Davis³, Kelley Pettee Gabriel⁵, Erin Dooley⁵, Sylvia Badon⁶, Rebecca Thurston³, Christopher Kline³

¹Pittsburgh VA Medical Center, ²University of Iowa, ³University of Pittsburgh, ⁴Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁵University of Alabama at Birmingham, ⁶Kaiser Permanente Northern California Division of Research

Introduction: Adherence to 24-hour movement behavior guidelines for sleep, sedentary behavior (SB), light-intensity physical activity (LPA), or moderate-to-vigorous intensity physical activity (MVPA) are independently associated with metabolic syndrome (MetS) risk in postmenopausal women, but adherence to these guidelines has rarely been examined together. Possible heterogeneity in associations with MetS by race/ethnicity and socioeconomic status (e.g., education and financial strain) are unclear. This study aimed to examine the association between adherence to the Canadian 24-hour movement guidelines and MetS in postmenopausal women.

Methods: Data from 1,078 participants (65.5 ± 2.6 y) in the Study of Women's Health Across the Nation were analyzed. Sleep and waking behaviors (SB, LPA, and MVPA) were assessed with wrist- (Actiwatch 2) and waist-worn (ActiGraph wGT3X-BT) accelerometry. Guideline adherence was based on the Canadian 24-hour movement guidelines; MetS was defined by National Cholesterol Education Program Adult Treatment Panel III criteria. Multivariable logistic regression estimated adjusted odds ratios (ORs) and 95% confidence intervals (CIs), adjusting for age, race/ethnicity, education, financial strain, and study site. Primary models included adherence to each guideline, while secondary models included the number of guidelines met. Interaction terms and stratified models tested modification by race/ethnicity, educational attainment, and financial strain.

Results: Overall, 26.9, 63.7, 88.2, and 86.1% met guidelines for sleep, SB, LPA, and MVPA, and 32.1% met criteria for MetS. Meeting SB (OR=0.55, 95% CI: 0.39-0.76), LPA (OR=0.56, 95% CI: 0.36-0.88), and MVPA guidelines (OR=0.59, 95% CI: 0.40-0.88) were each associated with lower odds of MetS; meeting the sleep guideline was not (OR=0.78, 95% CI: 0.56-1.08). Each additional guideline met was associated with 40% lower odds of MetS (OR=0.60, 95% CI: 0.52-0.70) and lower odds of elevated blood pressure, impaired glucose, low HDL, and high triglycerides. Interaction terms did not indicate heterogeneity by race/ethnicity, educational attainment, or financial strain, and stratified analyses did not reveal meaningful group differences.

Conclusion: In this diverse cohort of postmenopausal women, adherence to SB, LPA, and MVPA guidelines, particularly meeting

more guidelines, was associated with lower odds of MetS and components. These findings suggest the value of considering multiple 24-hour movement guidelines to minimize MetS risk in postmenopausal women.

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0829

ASSOCIATIONS BETWEEN SLEEP DISTURBANCES, VASOMOTOR SYMPTOMS AND HEALTH-RELATED QUALITY OF LIFE IN THE MENOPAUSAL TRANSITION AND EARLY POSTMENOPAUSE

Pauline Maki¹, Carina Dinkel-Keuthage², Motahhareh Nadimi², Ann-Kathrin Frenz², Yik Ming Fung², Simone Heeg², Kelly Genga³, Huda Shalhoub², Cecile Janssenswillen⁴, Nils Schoof², Elif Inan Eroglu²

¹University of Illinois Chicago, ²Bayer AG, ³Bayer SA, ⁴Bayer Consumer Care AG

Introduction: his analysis of the Study of Women's Health Across the Nation (SWAN) evaluated associations between self-reported sleep disturbances and/or vasomotor symptoms (VMS) and health-related quality of life (HRQoL) in menopausal women.

Methods: We used data from the baseline and first 10 annual follow-up visits (1999–2008) of SWAN. Among 2066 participants who had reached natural menopause, we reassigned the visit closest to final menstrual period (FMP) as FMP 0; and visits 5 years either side from FMP -5 to FMP +5. Sleep disturbances (multiple awakenings a night/trouble falling asleep/waking up earlier than planned ≥ 3 –4 nights/week in the past 2 weeks), VMS (hot flashes/night sweats ≥ 1 –5 days in the past 2 weeks), and HRQoL were assessed at each visit. HRQoL was based on mean scores of three Short-Form Health Survey (SF-36) subscales: role limitations due to physical health (RLPH), role limitations due to emotional problems (RLEP), and energy/fatigue (EF); scores range from 0–100 (higher scores indicating better HRQoL). Women were grouped by VMS only, sleep disturbances only, both, or neither symptom. Mixed models for repeated measures evaluated associations between sleep disturbances and/or VMS and HRQoL over time, adjusted for confounders including sociodemographic and lifestyle factors.

Results: Mean (standard deviation) age at FMP 0 was 51 (2.6) years. On the RLPH subscale, women with sleep disturbances only, VMS only, or both consistently scored lower than those with neither symptom (reference group). Mean (95% confidence interval [CI]) differences were -3.30 (-5.03, -1.56), -1.56 (-3.48, 0.37), and -4.76 (-6.45, -3.07), respectively. A similar pattern was observed on the RLEP and EF subscales. For RLEP, mean (95% CI) differences vs. reference group were -2.47 (-4.03, -0.90) for sleep disturbances only, -1.32 (-3.06, 0.42) for VMS only, and -1.80 (-3.32, -0.29) for both. For EF, differences were -2.55 (-3.41, -1.70), -0.44 (-1.38, 0.50), and -3.70 (-4.55, -2.86), respectively.

Conclusion: Sleep disturbances were associated with lower HRQoL, which was most notable when sleep disturbances co-occurred with VMS on the RLPH and EF subscales. Results suggest a need for effective measures to manage these symptoms in menopausal women.

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0830

EFFECTS OF ELINZANETANT ON WAKEFULNESS AFTER SLEEP ONSET IN POSTMENOPAUSAL WOMEN: POST HOC ANALYSIS OF NIRVANA STUDY

Hadine Joffe¹, Claudio Soares², Gary Zammit³, Rossella Nappi⁴, Pauline Maki⁵, Cecilia caetano⁶, Hoi-Shen Radcliffe⁷, Ulrike Krahn⁸, Huda Shalhoub⁹, Frank Kramer⁹, Christian Seitz⁹, Fiona Baker¹⁰

¹Brigham and Women's Hospital / Beth Israel Deaconess Medical Center / Harvard Medical School, ²Queen's University, ³Clinilabs, ⁴University of Pavia, San Matteo Hospital, Pavia, Italy, ⁵University of Illinois Chicago, ⁶Bayer Consumer Care AG, Basel, Switzerland, ⁷Bayer PLC, Reading, UK, ⁸Bayer AG, Wuppertal, Germany, ⁹Bayer AG, ¹⁰SRI International

Introduction: Nighttime wakefulness is common among postmenopausal women with vasomotor symptoms (VMS). Elinzanetant has previously shown improvements in patient-reported sleep outcomes in this population. The Phase II NIRVANA trial was the first to evaluate elinzanetant's effect on wakefulness after sleep onset (WASO) using both objective (polysomnography [PSG], Sleepiz One+) and subjective (Sleep Diary) measures. This post hoc analysis compared changes in WASO with elinzanetant across all three modalities.

Methods: NIRVANA randomized 110 postmenopausal women with PSG-confirmed WASO ≥ 30 minutes and ≥ 20 moderate-to-severe VMS/week to elinzanetant 120 mg (n=55) or placebo (n=55) once daily for 12 weeks. Sleep disturbances were assessed using in-lab PSG and patient-reported Sleep Diary for all participants, and with the contactless home-monitoring device Sleepiz One+ in a subset (elinzanetant: n=33, placebo: n=33). PSG assessments occurred at baseline, week 4, and week 12 (two consecutive nights/timepoint). Sleepiz One+ and diary data were collected nightly. WASO values were analyzed on the original scale for consistency in presentation across measures. A post hoc random coefficient model estimated overall treatment effects over 12 weeks for each modality.

Results: Elinzanetant demonstrated numerical reductions in WASO versus placebo across all assessment modalities. PSG: Baseline mean (standard deviation [SD]) WASO was 74.7 (34.8) minutes for elinzanetant and 82.8 (34.4) minutes for placebo. Overall treatment effect favored elinzanetant (least squares [LS] mean difference: -10.1 minutes; unadjusted 95% confidence interval [CI]: -18.5, -1.6). Sleepiz One+: Baseline mean (SD) WASO was 77.7 (52.6) minutes for elinzanetant and 61.7 (27.6) minutes for placebo. Overall treatment effect favored elinzanetant (LS mean difference: -17.7 minutes; unadjusted 95% CI: -27.1, -8.2). Sleep Diary: Baseline mean (SD) WASO was 42.4 (25.7) minutes for elinzanetant and 45.5 (25.6) minutes for placebo. Overall treatment effect favored elinzanetant (LS mean difference: -8.1 minutes; unadjusted 95% CI: -14.2, -1.9).

Conclusion: Greater reductions in WASO were observed with elinzanetant versus placebo across all modalities, consistent with previously reported improvements in sleep disturbances from the OASIS trials. While exploratory in nature, these findings support elinzanetant's potential use in improving sleep disturbances in menopausal women with VMS.

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0831

ELINZANETANT'S EFFECTS IN REDUCING POLYSOMNOGRAPHIC WAKEFULNESS AFTER SLEEP ONSET IN POSTMENOPAUSAL WOMEN: PHASE II NIRVANA EXPLORATORY STUDY RESULTS

Fiona Baker¹, Claudio Soares², Hadine Joffe³, Pauline Maki⁴, Malek Bajbouj⁵, Gary Zammit⁶, Cecilia caetano⁷, Ulrike Krahn⁸, Huda Shalhoub⁹, Frank Kramer⁹, Hoi-Shen Radcliffe¹⁰, Christian Seitz⁹

¹SRI International, ²Queen's University, ³Brigham and Women's Hospital / Beth Israel Deaconess Medical Center / Harvard Medical School, ⁴University of Illinois Chicago, ⁵Center for Affective Neuroscience, Charité, ⁶Clinilabs, ⁷Bayer Consumer Care AG, Basel, Switzerland, ⁸Bayer AG, Wuppertal, Germany, ⁹Bayer AG, ¹⁰Bayer PLC, Reading, UK

Introduction: Sleep disturbances are common among menopausal women with vasomotor symptoms (VMS). Elinzanetant has previously demonstrated patient-reported outcome (PRO) improvements in sleep disturbances in the OASIS studies. The Phase II NIRVANA trial further evaluated elinzanetant's effect on sleep parameters using objectively-measured polysomnography (PSG), in addition to PROs. This abstract reports effect on PSG-measured wakefulness after sleep onset (WASO) at weeks 4 and 12.

Methods: NIRVANA included 110 menopausal women with PSG-measured WASO ≥ 30 minutes and ≥ 20 moderate-to-severe VMS/week, randomized to elinzanetant 120mg (n=55) or placebo (n=55) once daily for 12 weeks. In-lab PSG assessments occurred at baseline, week 4, and week 12 (two consecutive nights/time point). Primary and secondary endpoints were changes from baseline in WASO at weeks 4 and 12, respectively, analyzed using mixed model with repeated measures. A prespecified analysis with log transformation was applied; least squares geometric mean ratios (LSGMR) are reported. Post hoc random coefficient model was applied to all individual night data to assess overall treatment effect and account for night-to-night variability.

Results: Baseline median WASO was 72.0 minutes (quartile [Q]1, Q3: 48.0, 90.3) for elinzanetant and 76.8 minutes (Q1, Q3: 54.0, 102.5) for placebo. At week 4, LSGMR to baseline was 0.68 (unadjusted 90% confidence interval [CI]: 0.59, 0.77) for elinzanetant and 0.94 (0.82, 1.08) for placebo, representing a 28% (unadjusted 90% CI: 13%, 41%) greater reduction with elinzanetant. At week 12, LSGMRs were 0.67 (0.57, 0.79) for elinzanetant and 0.76 (0.65, 0.90) for placebo, representing a 12% (-11%, 30%) greater reduction with elinzanetant. Night-to-night variability was notable, with WASO differing by >60 minutes in 15% of consecutive nights. The random coefficient model showed an 18% (unadjusted 95% CI: 5%, 30%) greater WASO reduction with elinzanetant vs. placebo, equating to an absolute reduction of ~13 minutes across the 12-week treatment period (assuming a baseline of 75 minutes).

Conclusion: Elinzanetant had a numerically greater reduction in WASO vs. placebo, an effect more pronounced at week 4. The modest but relevant improvement supports the effect of elinzanetant on menopause-related sleep disturbances, consistent with PROs from the OASIS trials.

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0832

HEAD-TO-HEAD COMPARISON OF A CONTACTLESS HOME SLEEP MONITOR WITH POLYSOMNOGRAPHY IN WOMEN WITH SLEEP DISTURBANCES ASSOCIATED WITH MENOPAUSE

Frank Kramer¹, Andrew Trigg², Hoi-Shen Radcliffe³, Ulrike Krahn⁴, Christian Seitz¹, Marc Rullan⁵, Harsha Umesh Babu⁵, Jonas Krauss⁵

¹Bayer AG, ²Bayer PLC, ³Bayer PLC, Reading, UK, ⁴Bayer AG, Wuppertal, Germany, ⁵Sleepiz AG

Introduction: Sleep disturbances are common in menopausal women, yet repeated in-laboratory polysomnography (PSG) is often costly and inconvenient. Home sleep monitoring may provide valuable insights in clinical trials. Sleepiz One+, a contactless home sleep monitor using radar technology, measures vital parameters and bodily movements during sleep. We evaluated the agreement and accuracy between the reference standard PSG and Sleepiz One+ in assessing sleep/wake status in women with menopause-associated sleep disturbances from the NIRVANA trial.

Methods: Postmenopausal women with sleep disturbances underwent simultaneous Sleepiz and PSG recordings for six nights (two consecutive nights at baseline, week 4, and week 12). PSG was conducted in qualified sleep laboratories by trained staff and scored manually by two independent treatment-blinded scorers, following American Academy of Sleep Medicine guidelines. Sleepiz data were analyzed automatically using proprietary algorithms. Time synchronization between modalities was achieved using PSG's "lights-off"/"lights-on" markers and respiratory signal alignment. The final dataset included 237,258 epochs (30-second intervals) from 66 individuals. Modalities were compared using epoch-level and parameter-level analyses. For epoch-level analysis, sleep/wake status was compared one by one between devices to calculate sensitivity, specificity, overall accuracy, and prevalence-adjusted bias-adjusted kappa (PABAK), presented as mean (95% confidence intervals [CIs]) across subjects. Parameter-level comparisons (e.g., wakefulness after sleep onset [WASO], total sleep time, sleep efficiency) were calculated per night by each method and compared between devices.

Results: Epoch-level comparison showed that Sleepiz achieved a mean (95% CI) sensitivity of 0.91 (0.89, 0.94) for detecting sleep, a specificity of 0.64 (0.60, 0.68) for detecting wake, and an overall accuracy of 0.86 (0.84, 0.88) versus PSG. PABAK was 0.72 (0.68, 0.76), indicating substantial agreement. Parameter-level comparisons showed that Sleepiz underestimated WASO by 4.8 minutes, latency to persistent sleep by 9.6 minutes, total sleep time by 7.1 minutes, number and duration of awakenings by 0.4, and 1.0 minutes, respectively. Sleep efficiency was overestimated by 2.1%.

Conclusion: Epoch-level and parameter-level comparisons demonstrated good agreement between Sleepiz and PSG, supporting Sleepiz as a contactless home sleep assessment tool in clinical trials.

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0833

INSOMNIA SYMPTOMS AND BIOLOGICAL AGING IN A WELLNESS COHORTJonathan Rabinowitz¹, Jonathan Rabinowitz¹, Ohad Green², Sharon Toker³, David Erez¹¹Bar Ilan University, ²CEMEX, Gr T Popa Univ., ³Tel Aviv University

Introduction: Insomnia is associated with chronic disease and mortality. Biological age indices derived from physiological and anthropometric markers provide a quantitative estimate of aging beyond chronological age. The association between subjective insomnia severity and biological aging in adults attending routine wellness visits remains poorly characterized. This study examined whether greater insomnia symptom burden is associated with accelerated biological age in a large cohort.

Methods: We analyzed data from a large adult cohort attending routine medical screening (males, n=10,656; females, n=6,279). Insomnia was assessed using the Athens Insomnia Scale (AIS-5), rated on a 1 (low) to 7 (high) scale, and scores were averaged to yield an insomnia score. Biological age was estimated using regression models based on data from whole-blood biomarkers, exercise stress test parameters, and body roundness index (BRI). Biological age acceleration was defined as the difference between biological age and chronological age (years). Sex stratified linear models tested associations between insomnia severity and biological age acceleration.

Results: A significant linear relationship was observed between insomnia severity and accelerated biological aging in both males and females (males: $F=215.94$, $df=1$, 10,646, $p<.001$; females: $F=120.91$, $df=1$, 6,169, $p<.001$). Among males, those in the lowest decile for insomnia (best sleepers) had a biological age 2.2 years younger than their chronological age. In contrast, those in the highest decile (worst sleepers) had an accelerated biological age of 1.9 years. For females, the corresponding range was 2 years younger for the best sleepers and 1.7 years older for the worst sleepers. BRI contributed most to estimating biological age. To identify potentially modifiable variables, we adjusted BRI and AIS-both age-dependent variables-for age and found that the significant positive linear association between them remained (males: $F=53.67$, $df=1$, 11,849, $p<.001$; females: $F=18.82$, $df=1$, 6,875, $p<.001$).

Conclusion: Higher insomnia symptom burden was associated with accelerated biological aging. These findings suggest that insomnia may be a clinically relevant and potentially modifiable correlate of accelerated biological aging in real-world preventive care settings.

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0834

NIGHT-BY-NIGHT ASSOCIATIONS BETWEEN SLEEP AND MOOD IN AGING AND PARKINSON'S DISEASEDaria Shariff¹, Nicole Arra², Eva Muller-Oehring¹, Sara Lorkiewicz¹, Tilman Schulte², Kathleen Poston¹, Fiona Baker², Joseph Winer¹¹Stanford University, ²SRI International

Introduction: Sleep disturbances are common in older adults and are risk factors for depression and anxiety. Sleep and mood dysfunction both represent common symptoms in Parkinson's disease (PD), but the association between them is not well understood. Here, we investigated whether sleep disturbance contributes to mood symptoms among older adults with and without PD.

Methods: Data were collected from 55 participants aged ≥ 50 (33 clinically unimpaired [CU] and 22 with PD), as part of a broader study evaluating cognitive decline and parkinsonism. Participants completed the Beck's Depression Inventory (BDI) and State-Trait Anxiety Inventory (STAI), and daily ecological momentary assessments of morning depressed mood. Sleep was subjectively assessed with the Pittsburgh Sleep Quality Index (PSQI). At-home objective sleep data were recorded with an Oura™ device worn over 7-14 days assessing total sleep time (TST), sleep efficiency (SE), and REM and deep sleep proportion. Group differences and night-by-night associations were examined using ANCOVAs and linear mixed effects models including age as a covariate.

Results: PD participants reported worse mood relative to CU, with higher BDI ($p<0.0001$) and STAI (STAI-S: $p=0.0009$; STAI-T: $p=0.01$) scores and worse morning mood ($p=0.002$). PD participants also had worse subjective sleep quality with higher global PSQI scores ($p=0.0001$). For device-estimated measures of sleep, participants with PD had lower mean SE ($p=0.002$), TST ($p=0.03$), and REM sleep proportion ($p<0.0001$) than CU, but did not differ from CU in deep sleep proportion. Deep sleep proportion decreased with older age ($p=0.005$) irrespective of group. Analyses of nightly sleep, predicting next-morning depressed mood, showed that lower SE ($p=0.03$) and older age ($p=0.003$) predicted worse mood in both groups. However, shorter TST predicted next-morning depressed mood specifically in PD (TST-by-group interaction $p=0.006$).

Conclusion: Parkinson's disease is associated with worse subjective and objective sleep quality, and elevated depressive and anxiety symptoms. Beyond group differences, day-to-day variations in sleep efficiency predicted worse next-day mood, suggesting that poor sleep meaningfully contributes to mood. Improving night-to-night sleep efficiency in older adults, plus nightly total sleep time in people living with Parkinson's disease, may improve mood symptoms.

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0835

PREOPERATIVE SLEEP QUALITY IS ASSOCIATED WITH SHORT-TERM POSTOPERATIVE COGNITIVE RECOVERY IN OLDER SURGICAL PATIENTSRuixue Cai¹, Anaëlle Charles², Mili Jimenez Gallardo¹, Andrea Castillo Suárez¹, Mansi Chhajed¹, Karoline Sanchez¹, Kun Hu¹, Peng Li¹, Lei Gao¹¹Massachusetts General Hospital/Harvard Medical School,²Perioperative Sleep and Brain Lab (PSBL), Medical Biodynamics Center, Massachusetts General Hospital

Introduction: Sleep disturbances are common among older adults and have been linked to adverse health outcomes, including cognitive impairment. However, sleep is rarely assessed before major surgery in older patients, and it remains unclear whether preoperative sleep quality is associated with postoperative cognitive decline.

Methods: We analyzed data from an ongoing prospective cohort of older adults (≥ 70 y) undergoing surgery, including knee, hip, spine,

general, and vascular procedures ($n = 34$). Preoperative sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) at one week before surgery (baseline). Cognitive function was measured using a modified version of the Montreal Cognitive Assessment (MoCA) at baseline and 1 month postoperatively, with scores ranging from 0 to 22. Linear regression models were used to examine associations between preoperative sleep quality and Δ MoCA (difference between 1-month and baseline). Model adjusted for baseline MoCA score, age, sex, and surgical type.

Results: Mean MoCA score at baseline was 19.38 (SD 2.06), and mean MoCA score at 1 month after surgery was 20.50 (SD 1.26), resulting in a mean Δ MoCA of 1.12 (SD 1.68), suggesting a trend towards postoperative cognitive recovery. Poorer preoperative sleep quality predicted smaller postoperative cognitive gains. In the adjusted model, each 1-SD increase in PSQI score was associated with a 0.48-point smaller Δ MoCA score ($\beta = -0.48$, $p < 0.001$). Age, sex, and surgical type were not significantly associated with cognition change (all $p > 0.05$), whereas a higher baseline MoCA score was associated with smaller improvement ($\beta = -0.74$, $p < 0.001$).

Conclusion: Poor preoperative sleep quality is associated with worse short-term postoperative cognitive recovery in older adults. These preliminary findings highlight perioperative sleep health as a potential modifiable factor in cognitive recovery. Future analyses with the completed target cohort of 150 patients, longer follow-up, and objective sleep measures will provide a more comprehensive understanding of the relationship between sleep and cognitive trajectories.

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0836

REST ACTIVITY RHYTHMS AND METABOLIC OUTCOMES OF MIDLIFE WOMEN BEFORE AND AFTER MENOPAUSE IN THE MIDLIFE IN THE UNITED STATES STUDY

Ava Goettel¹, Yamnia Cortés², Chooza Moon²

¹University of Iowa College of Nursing, ²University of Iowa

Introduction: Menopause is associated with increased metabolic and cardiovascular disease (CVD) risk. Aging influences sleep and rest-activity rhythms (RAR), and menopause is particularly associated with sleep disruptions and reduced physical activity. However, limited research has examined how RAR patterns differ after menopause and how they relate to cardiometabolic outcomes. This study aimed to investigate the relationship between menopause and RAR, and to explore how these RAR influence cardiometabolic risk factors in combination with menopause.

Methods: A total of 515 women with menopause status data (median age = 52; range = 34–84 years) from the Midlife in the United States 2 (MIDUS 2) study were used. Responses from the question 'have you had your period in the last year?' were used to determine menopausal status (i.e., perimenopausal vs. Postmenopausal). We used 7-day actigraphy data to assess RAR parameters (i.e., MESOR, amplitude, acrophase, and R-squared). Fasting glucose, HbA1C, blood pressure, total cholesterol, and LDL cholesterol were assessed to evaluate cardiometabolic risk factors. Multiple regression tested associations between menopause, RAR, and metabolic outcomes, including interaction terms (menopause X RAR).

Results: After accounting for covariates, menopausal status moderated the relationship between amplitude and systolic blood pressure ($\beta = 0.23$, $p = 0.008$). The interaction between menopausal status and acrophase was significantly associated with glucose ($\beta = -4.053$, $p = 0.013$) and HbA1c levels ($\beta = -0.18623$, $p = 0.009$), but not with other metabolic profiles.

Conclusion: We found that higher amplitude was associated with lower systolic blood pressure in post menopausal women. An earlier acrophase was significantly associated with higher glucose and HbA1c levels in postmenopausal women than in perimenopausal women. Future studies with comprehensive assessments of menopausal status and activity patterns are needed to elucidate these relationships further.

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0837

SHORT SLEEP BEFORE SURGERY IS ASSOCIATED WITH EARLY POSTOPERATIVE FUNCTIONAL STATUS IN OLDER ADULTS

Mili Jimenez Gallardo¹, Andrea Castillo Suárez¹, Mansi Chhajed¹, Karoline Sanchez¹, Anaëlle Charles², Ruixue Cai¹, Peng Li¹, Kun Hu¹, Lei Gao¹

¹Massachusetts General Hospital/Harvard Medical School,

²Perioperative Sleep and Brain Lab (PSBL), Medical Biodynamics Center, Massachusetts General Hospital

Introduction: Lack of sleep is highly prevalent in older adults and associated with poorer health outcomes. However, sleep is rarely assessed or incorporated into risk stratification prior to major surgery. Whether preoperative sleep duration is associated with functional recovery across a broad surgical population remains unclear.

Methods: In our ongoing Alzheimer's Association-funded study, 35 older adults (≥ 70 years; target of 150) have been recruited one week before their major surgery (general, joint, or vascular surgery) and are followed after surgery. Participants completed the Pittsburgh Sleep Quality Index (PSQI) and the Functional Activities Questionnaire (FAQ) to assess baseline self-reported sleep duration and functional recovery. Sleep duration was assessed at baseline using self-reported, categorized as < 6 hours, 6–8 hours, and > 8 hours. Linear regression models were used to examine the association between baseline sleep duration and outcomes at 1 month after surgery. Models were adjusted for baseline FAQ score, age, sex, and surgical type.

Results: Baseline sleep duration was not associated with baseline FAQ scores (all $p > 0.75$). In the adjusted model using 6–8 hours as the reference category, short sleep duration (< 6 hours) at baseline was associated with higher (worse) FAQ scores at 1 month, after adjusting for baseline FAQ and covariates ($\beta = 5.33$, $p = 0.003$). The fully adjusted model explained 77% of the variance in 1-month FAQ scores, with an adjusted $R^2 = 0.71$ after accounting for model complexity. In contrast, longer sleep duration (> 8 hours) was not significantly different from the reference group. At the current sample size, the overall PSQI score and other PSQI components also did not show significant associations with 1-month postoperative FAQ outcomes.

Conclusion: Short sleep prior to surgery was linked to higher FAQ scores at 1 month, suggesting that preoperative sleep may influence postoperative functional status at 1 month, independent of baseline function. These results could highlight the importance of perioperative sleep assessment. Future analysis with a larger sample, longer follow-ups (3- and 12-month), additional adjustments for preoperative health status, and repeated sleep assessments is warranted to assess the longitudinal relationship between sleep and surgical recovery.

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0838

SLEEP QUALITY AND SARCOPENIC OBESITY AMONG AGING ADULTS IN INDIA

Hema Ramamurthi¹, Koushikkee Raguraman², Saramma Mini Jacob²

¹University of Maryland Baltimore, ²Sree Balaji Medical College and Hospital

Introduction: Rising obesity rates and population aging create a prime environment for the development of sarcopenic obesity (SO) in India. Sarcopenic obesity is the coexistence of excess fat mass and sarcopenia within an individual. Some studies suggest that sleep characteristics may contribute to the development of SO. Although the prevalence of sarcopenic obesity has been examined in studies from India, the role of sleep in SO has not yet been investigated. Our objective was to describe the association between sleep quality and sarcopenic obesity among aging adults in India.

Methods: We analyzed cross-sectional data from the Longitudinal Ageing Study in India (LASI; Wave 1, 2017–2018) for associations between sociodemographic characteristics, sleep quality, and SO. Summed sleep scores were dichotomized; sarcopenia was determined using gait speed and handgrip strength; and body mass index cutoffs for Asian populations were used to classify obesity.

Results: Among 58,672 respondents, 50% reported poor sleep, 37,977 (65%) had sarcopenia and 18% had SO. Unadjusted odds ratios indicated that being female (OR: 2.22; CI: 2.12–2.32), age 45–64 (OR: 1.30; CI: 1.20–1.33), widowed (OR: 1.23; CI: 1.17–1.30), higher BMI (OR: 1.57, CI: 1.55 – 1.58), more comorbidities (OR: 4.43; CI: 4.20–4.68), and poor sleep quality (OR: 1.23; CI: 1.18–1.28) were associated with increased odds of SO. In multivariate models adjusted for sociodemographic factors, poor sleep was associated with 15% higher odds of sarcopenic obesity.

Conclusion: Poor sleep quality is experienced by a substantial proportion of older adults in India and is significantly associated with increased odds of sarcopenic obesity.

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0839

BEYOND SLEEP BENEFITS: PATIENT-REPORTED QUALITY-OF-LIFE IMPROVEMENTS WITH PAP THERAPY FOR OSA

Leanne Kaye, Vy Vuong, Fatima Sert-Kuniyoshi, Anita Malik, Caleb Woodford, Will McConnell, Crystal Kuy, Kimberly Sterling
Resmed Science Center

Introduction: Quality of life is an important patient experience metric in obstructive sleep apnea (OSA). As such, we assessed changes in multi-dimensional quality-of-life outcomes following initiation of positive airway pressure (PAP) therapy and examined differences by gender.

Methods: Adults (18+) residing in the United States and using PAP therapy (Resmed) for the treatment of OSA were invited to complete an online survey on pre- and post-therapy OSA symptoms and experiences. Questions on changes in productivity, relationships, and well-being following PAP initiation were rated using a 5-point Likert scale ranging from 1 (significantly worsened) to 5 (significantly improved). Descriptive statistics summarized the frequency of reported changes across survey items, and unadjusted hypothesis tests were used to examine differences by gender.

Results: 1,871 respondents were included in the analysis (mean age: 56.0 years, 54.6% female, 44.3% with severe OSA; 47.7% on PAP therapy < 30 days). Overall, 88.7% of respondents reported an improvement in at least one quality of life outcome. Most respondents reported an improvement in 'overall quality of life' (73.3%) and 'overall health' (68.9%). Respondents also reported an improvement in 'productivity at work/school' (61.8%) and a reduction in missed work/school days (35.4%). Relationship dynamics also improved, with improved bed partner sleep quality (70.2%), improved relationship quality (45.6%), reduced conflict frequency (40.6%) and intensity (39.5%), and stronger connection (39.4%). Moreover, 59% of respondents reported greater enjoyment of hobbies and activities, and an improved ability to travel and engage in leisure activities (51.5%). Differences by gender emerged such that females (vs. males) reported greater improvement in missed work/school days ($p < 0.001$), productivity ($p = 0.012$), and communication ($p = 0.012$). Conversely, more males reported an improvement in bed partner sleep quality than females ($p = 0.003$).

Conclusion: Initiation of PAP therapy was associated with self-reported improvements in productivity, relationship quality, and overall well-being. Females reported greater improvement in productivity and relationship communication whereas males more frequently reported improvement in bed partner sleep quality. These findings demonstrate multidimensional quality-of-life benefits beyond clinical symptom relief and may inform strategies to personalize and support continued PAP usage.

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0840

ELINZANETANT IMPROVES SLEEP DISTURBANCES PARTY INDEPENDENT OF NIGHTTIME VASOMOTOR SYMPTOMS: POST-HOC MEDIATION ANALYSIS FROM FOUR TRIALS

Pauline Maki¹, Andrew Trigg², Hadine Joffe³, Rossella Nappi⁴, Nick Panay⁵, James Simon⁶, Rebecca Thurston⁷, Cecilia caetano⁸, Christian Seitz⁹, Claudio Soares¹⁰

¹University of Illinois Chicago, ²Bayer PLC, ³Brigham and Women's Hospital / Beth Israel Deaconess Medical Center / Harvard Medical School, ⁴University of Pavia, San Matteo Hospital, Pavia, Italy, ⁵Queen Charlotte's & Chelsea Hospital, Imperial College, London, UK, ⁶George Washington University, IntimMedicine Specialists, ⁷University of Pittsburgh, ⁸Bayer Consumer Care AG, Basel, Switzerland, ⁹Bayer AG, ¹⁰Queen's University

Introduction: Elinzanetant has demonstrated efficacy in reducing vasomotor symptoms (VMS) and sleep disturbances in postmenopausal women. This post hoc analysis assessed whether elinzanetant improves sleep disturbances independently of nighttime VMS reduction via mediation analysis.

Methods: Pooled data from the elinzanetant 120 mg and placebo arms of the Phase III OASIS-1, -2, -3 trials and the Phase II NIRVANA trial were analyzed. The 12-week OASIS studies enrolled postmenopausal women with moderate-to-severe VMS (≥ 50 /week for OASIS-1, -2; no minimum for OASIS-3) but no requirements for sleep disturbances. NIRVANA included postmenopausal women with moderate-to-severe VMS (≥ 20 /week) and sleep disturbances. VMS frequency was documented twice daily via a morning diary (recalling nighttime VMS) and evening diary (recalling daytime VMS). Sleep disturbances were assessed using Patient-Reported Outcomes Measurement Information System Sleep Disturbance Short Form (PROMIS SD SF) 8b total T-scores at weeks 1, 2, 3, 4, 8, and 12. Nighttime VMS frequency served as a mediator in a longitudinal causal mediation analysis that partitioned total treatment effect (elinzanetant versus placebo) into natural direct effect (NDE; sleep improvement independent of nighttime VMS reduction) and natural indirect effect (NIE; improvements on sleep mediated by nighttime VMS reduction), adjusted for baseline values and confounders.

Results: Among 1,345 women (elinzanetant: $n=668$; placebo: $n=677$), baseline mean (standard deviation [SD]) nighttime moderate-to-severe VMS frequency was 4.83 (4.84), while mean (SD) PROMIS SD SF 8b total T-score was 59.58 (7.26). The total treatment effect of elinzanetant on sleep was -4.92 (95% confidence interval [CI] -5.73, -4.12). Of this effect, the NDE accounted for -2.67 (95% CI -3.28, -2.07), while the NIE contributed to -2.25 (95% CI -2.81, -1.69). The proportion of the total effect attributable to the NDE was 54.3% (95% CI 45.8%, 62.8%).

Conclusion: Elinzanetant improved sleep disturbances both directly and indirectly via reduction of nighttime VMS, indicating that over half of its benefit on sleep occurs independently of VMS improvement. These findings suggest that menopausal sleep disturbances are partly independent of VMS and that elinzanetant may target distinct sleep-related pathways.

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0841

MORNING BRIGHT LIGHT THERAPY IMPROVES SLEEP IN VETERANS WITH TRAUMATIC BRAIN INJURY: INTERIM ANALYSES OF A RANDOMIZED, PLACEBO-CONTROLLED TRIAL

Hannah Cunningham¹, Allison Keil², Brittany Ligan³, Mohini Bryant-Ekstrand³, Andrea Wilkerson⁴, Sara Mithani⁵, Jessica Gill⁶, Jonathan Elliott¹, Miranda Lim⁷

¹Oregon Health & Science University, ²McGill University, ³VA Portland Health Care System, ⁴Pacific Northwest National Laboratory, ⁵UTHealth Houston, ⁶Johns Hopkins School of Nursing, ⁷VA Portland Health Care System, Research Service

Introduction: Traumatic brain injury (TBI) is associated with persistent sleep-wake dysfunction, including insomnia and circadian rhythm disruption, which can exacerbate functional outcomes. Present therapies to treat TBI-associated sleep-wake disturbances (e.g., cognitive behavioral therapy for insomnia) are limited by

marginal efficacy, poor patient acceptability, and/or high patient/provider burden. Morning bright light therapy (MBLT) is a simple, cost-effective, home-based sleep intervention with pleiotropic effects spanning sleep, circadian realignment, cognition, and mood.

Methods: The present data represent an interim analysis of an ongoing randomized, placebo-controlled clinical trial in Veterans with TBI ($n=70$). Veterans were randomized 2:1 to either MBLT ($n=48$) or non-light sham ($n=22$) and engaged in 60-minutes per day (within 2-hours of waking) to either device (MBLT; 10,000lux) for 4-weeks. Before the intervention, a 2-week baseline of sleep-wake recording was established. Primary outcomes include self-reported sleep, mood, cognition, and quality of life, as well as objective assessments of sleep and cognition, via actigraphy and neuropsychological testing, respectively.

Results: The MBLT group demonstrated improved self-reported sleep (insomnia severity index scores, $14 \pm 20\%$), coinciding with increased time in bed (59 ± 67 min), earlier sleep-onset (77 ± 125 min), and earlier mid-sleep time (37 ± 72 min), suggestive of circadian phase advancement. Self-reported cognition as well as short-term working memory (via the Hopkins Verbal Learning Test and the digit span test) both improved following MBLT, with concomitant improvements in mood, depression, and quality of life. Significant associations were found when considering PTSD or those with comorbid TBI, PTSD, and chronic pain (polytrauma clinical triad) as covariates. Plasma-based biomarkers also showed significant improvement in a sub-sample of $n=20$ MBLT participants, with reductions in ~ 20 proinflammatory cytokines, several pro-thrombotic clotting factors, and relevant neurodegenerative markers (e.g., pTau-217). There were no changes in the sham group.

Conclusion: MBLT is a feasible and highly acceptable home-based intervention to improve sleep and quality of life in Veterans with TBI. Additional work is needed to explore the therapeutic potential for MBLT in Veterans with either comorbid PTSD or the polytrauma clinical triad. Improvements in sleep likely contributed to downstream improvements observed in mood, depression, cognition, and pain management. This ongoing trial will serve as important scientific precedent for future work.

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0842

THE AGE PARADOX: PAP THERAPY AND DEPRESSION IN OSA

Iryna Witt, Antonio Santana, Tesnim Hamdan, Nameer Ascardar, Jacob Slowinski, Iryna Chyshkevych
Sarasota Doctors Hospital/ USF Morsani College of Medicine

Introduction: Depression affects nearly 40% of older adults with obstructive sleep apnea (OSA), yet treatment outcomes remain poorly understood in this population. While positive airway pressure (PAP) therapy improves depression in middle-aged patients, no systematic review has examined age-specific effects. We investigated whether PAP therapy reduces severe depression outcomes and improves depression symptoms in adults aged ≥ 65 years compared to younger populations. We addressed a critical gap in geriatric sleep medicine.

Methods: We searched four databases (MEDLINE, Embase, PsycINFO, Cochrane Library) through August 2024 for studies

examining PAP therapy's effect on depression in OSA patients. Primary outcomes were severe depression events: self-harm, emergency department visits, and psychiatric hospitalizations. Secondary outcomes included validated depression scales (HADS-D, PHQ-9, BDI, CES-D). Studies were stratified by age: elderly (≥ 65 years) versus mixed-age (< 65 years). Two independent reviewers extracted data and assessed bias using Cochrane tools. Random-effects meta-analysis pooled elderly-specific trials. Evidence quality followed GRADE methodology.

Results: Nine studies (40,240 participants) met inclusion criteria. In mixed-age adults ($n=37,459$, mean age 50.9 years), PAP adherence dramatically reduced self-harm events by 20% ($p < 0.001$), emergency visits by 27% ($p < 0.001$), and psychiatric hospitalizations ($p=0.019$). Strikingly, four high-quality RCTs in elderly patients ($n=553$, age ≥ 65 years) showed zero improvement in depression scales, despite robust improvements in sleepiness (Epworth -2.1 points, $p < 0.0001$) and quality of life ($p < 0.004$). This paradox persisted in the largest trial ($n=278$, 12-month follow-up). Meta-analysis confirmed null effect on depression symptoms (pooled effect -0.12, 95% CI: -0.48 to 0.24, $p=0.52$, $I^2=0\%$).

Conclusion: Age fundamentally alters PAP therapy's effect on depression in OSA. While PAP prevents severe depression crises in younger adults, it fails to improve depression symptoms in elderly patients, despite clear benefits for sleepiness and function. Clinicians should adjust expectations when treating older patients and consider adjunctive depression management. This finding reveals an urgent need to understand why aging confers treatment resistance and develop age-appropriate interventions.

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0843

LONGITUDINAL PREDICTORS OF SLEEP PROBLEMS AMONG CO-RESIDING FAMILY CAREGIVERS OF OLDER ADULTS: FINDINGS FROM NATIONAL DATA

Youngmin Cho¹, Yiqing Qian¹, Katherine Ornstein¹, Junxin Li²

¹Johns Hopkins University School of Nursing, ²School of Nursing, Johns Hopkins University

Introduction: Sleep disturbance is prevalent among family caregivers; however, prior studies have largely examined global sleep quality cross-sectionally rather than using longitudinal approaches to understand specific problems. General sleep difficulty and caregiving-related interruptions likely have different drivers. For instance, care recipient dementia or sleep disturbance may necessitate nighttime care and increase caregiving-related sleep interruptions, whereas caregiver strain may underlie a general sleep problem in caregivers. Using a national, longitudinal sample of co-residing caregivers of older adults, we examined whether baseline caregiver strain and care recipient characteristics predict difficulty resuming sleep and caregiving-related sleep interruptions at 2-year follow-up.

Methods: We analyzed data from the National Study of Caregiving (NSOC) linked to the National Health and Aging Trends Study (NHATS) Rounds 5 (baseline) and 7 (follow-up). In a sample of 608 co-residing caregivers, we conducted logistic regression to examine caregiver sleep problems (difficulty resuming sleep and caregiving-related interruption) at follow-up in relation to baseline care recipients' factors (sleep disturbances and dementia

status), caregiver physical, emotional, and social strain. Covariates included caregivers' sleep problems and demographics at baseline. Survey weights were applied.

Results: Co-residing caregivers were predominately female (63.8%) and Non-Hispanic White (64.6%). About 20.0% were caring for older adults living with dementia. At baseline, 47.7% of caregivers reported difficulty resuming sleep and 23.8% experienced caregiving-related sleep interruptions. Baseline care recipient sleep and physical strain were not significantly associated with either caregiver sleep problem at follow-up. Compared to non-dementia caregivers, dementia caregivers had 2.81 times the odds of caregiving-related sleep interruptions at follow-up (95%CI [1.15–6.86]). Caregivers' emotional strain (OR=1.83, 95%CI [1.02–3.26]) was associated with caregiving-related sleep interruptions. Notably, caregivers' social strain was associated with both difficulty resuming sleep (OR=2.15, 95%CI [1.22–3.79]) and caregiving-related sleep interruptions (OR=2.95, 95%CI [1.42–6.17]).

Conclusion: Findings suggest caregiver sleep problems may be primarily driven by caregiver strain and the dementia care context. Interventions to improve caregiver sleep should prioritize alleviating caregivers' social and emotional strain, with targeted support for dementia caregivers. Incorporating objective sleep measures in future studies would help validate self-reported sleep disturbances and better understand the impact of caregiver strain.

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0844

THE EFFECTS OF MEDITATION-BASED INTERVENTIONS ON SLEEP QUALITY AMONG OLDER ADULTS WITH MILD COGNITIVE IMPAIRMENT: A SYSTEMATIC REVIEW

Jieun Lim, Adriana Perez

University of Pennsylvania School of Nursing

Introduction: Sleep disturbances are common among older adults with mild cognitive impairment (MCI) and linked to cognitive decline and reduced quality of life. Pharmacological treatment remains prevalent despite safety concerns such as falls, delirium, and cognitive worsening. Meditation-based interventions (MBIs), including mindfulness, mantra, and sound-based practices, may improve sleep and psychological well-being, yet evidence in MCI populations remains limited and heterogeneous. This systematic review evaluated the effectiveness of MBIs on sleep quality among adults aged ≥ 55 years with MCI and identified implications for gerontological nursing practice.

Methods: Following PRISMA 2020 guidelines, five databases (PubMed, PsycINFO, Embase, CINAHL, and Google Scholar) were searched through June 2025. Eligible studies included RCTs, pilot RCTs, and quasi-experimental designs targeting adults aged ≥ 55 years with MCI. Studies were required to use validated sleep measures (PSQI, ISI, AIS, ESS, actigraphy, EEG). Risk of bias was assessed using RoB 2.0 and ROBINS-I, and certainty of evidence using GRADE. Narrative synthesis was conducted due to heterogeneity.

Results: Seven studies ($n = 434$) met inclusion criteria. Interventions lasted 4–12 weeks and included mindfulness, mantra, sound meditation, and hybrid. Five studies demonstrated significant improvements in subjective sleep quality; one actigraphy-based

study reported reduced daytime napping, and one showed short-term benefits that were not maintained at follow-up. Longer duration and greater adherence yielded stronger effects. Secondary outcomes included reduced anxiety, stress, and depression, and improved attention and memory. Overall, evidence indicated moderate certainty that MBIs may improve subjective sleep quality in MCI.

Conclusion: Current evidence suggests MBIs show promise in improving subjective sleep quality and psychological well-being among adults aged ≥ 55 years with MCI. Integrating meditation-based strategies could be explored as a potential, supportive approach within gerontological nursing and community programs, but caution is warranted given the limited and heterogeneous evidence base. Future research should include large, multi-site RCTs with standardized protocols, both objective and subjective sleep assessments, and diverse populations to strengthen generalizability and guide evidence-based practice.

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0845

ACTIGRAPHY-MASURED SLEEP IS IMPROVED AFTER DIETARY SUPPLEMENTATION IN OLDER ADULTS WITH MILD TRAUMATIC BRAIN INJURY: A RANDOMIZED CLINICAL TRIAL

Hannah Cunningham¹, Savanah Sicard¹, Cosette Olivo¹, Jessica Brewer¹, Katherine Powers¹, Laura Dovek¹, Rachel Champaigne¹, Andrea Hildebrand¹, Akiva Cohen², Jonathan Elliott¹, Miranda Lim³

¹Oregon Health & Science University, ²University of Pennsylvania, ³VA Portland Health Care System, Research Service

Introduction: Sleep-wake disturbances are strongly associated with traumatic brain injury (TBI) and frequently persist into the chronic recovery phase. Clinical interventions to improve these disturbances are limited, being symptom-directed or with excessive patient-provider burden. Preclinical work in a rodent model of TBI show that dietary supplementation with branched-chain amino acids (BCAA: leucine/isoleucine/valine) restores a normal sleep-wake phenotype, mechanistically via restoring orexin/hypocretin input in the lateral hypothalamus. The present data reflect the field's first effort at translating these preclinical data to humans in a large-scale, double-blinded, placebo-controlled clinical trial.

Methods: Veterans with TBI (n=175 enrolled) were randomized via covariate adaptive randomization and n=160 allocated (1:1:1:1) to high (30g b.i.d.), medium (20g b.i.d.), and low (10g b.i.d.) BCAAs or placebo (rice protein, 10g b.i.d.) for 12 weeks. Actigraphy was continuously recorded. The effect of BCAAs (group) on total sleep time (TST), sleep-onset-latency (SOL), wake-after-sleep-onset (WASO), sleep efficiency (SE), and awakenings was examined using linear models. All models were adjusted for sex, age, PTSD, depression, TBI recency, and pain. Participant ID was included as a random factor to account for repeated measures.

Results: 154 age- and sex-matched (49 $\pm$ 10 years of age, 73% male) Veterans with TBI were analyzed: placebo (n=36), low (n=40), medium (n=35), and high (n=43) dose groups. Participants in the high-dose group demonstrated an increase in TST of 0.66 minutes/day (~55min over 84-days, $p < 0.001$), a decrease in WASO of 0.21 minutes/day (~17.6min over 84-days, $p < 0.001$), and an increase in SE of 0.05% per day (~4.2% over 84-days, $p = 0.01$)

compared to placebo. Effects in the medium- and low-dose groups were less robust, with both showing an increase in SE compared to placebo (medium: ~5.0% over 84-days, $p < 0.001$; low: ~3.4% over 84-days, $p = 0.03$), and only the low-dose group showing a decrease in WASO compared to placebo (~18.5min over 84-days, $p < 0.001$). No changes were present in SOL or awakenings.

Conclusion: Dietary BCAA supplementation at 60g/day improves objective metrics of sleep in Veterans in the chronic phase of recovery from TBI. Future and ongoing work will examine changes in spectral power during sleep and cognitive function.

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0846

DO WEARABLES AGREE? CONCORDANCE OF COMMERCIAL AND RESEARCH-GRADE SLEEP MEASURES IN OLDER ADULTS ACROSS HEALTHY AND CLINICAL COHORTS

Nicole Arra¹, Daria Shariff², Eva Muller-Oehring², Fiona Baker¹, Tilman Schulte¹, Kathleen Poston², Joseph Winer²

¹SRI International, ²Stanford University

Introduction: Sleep in aging is characterized by decreased sleep quantity and quality, further amplified in clinical populations, such as Parkinson's disease (PD) and people living with HIV (PLWH). Wearables such as actigraphy and commercial devices are increasingly deployed in remote sleep monitoring, yet validation of these technologies primarily reflects young healthy adults under laboratory conditions. Whether these devices align to daily sleep diaries – a standard measurement in the field – in older adults and clinical populations has not been adequately examined.

Methods: Adults ≥ 50 years were recruited into three groups: healthy controls (n=33), PD (n=21), PLWH (n=21). Participants completed 7-14 consecutive nights of at-home sleep monitoring, as part of an ongoing observational study, wearing an Axivity AX3 wrist actigraphy, Oura ring (generation 3 model), and completing daily electronic sleep diaries. Total sleep time (TST), sleep efficiency (SE), and wake after sleep onset (WASO) were derived for each night using the GGIR R package for actigraphy and default software for the ring. These metrics were compared across devices and diaries using night-by-night Spearman correlations and Bland-Altman analyses to calculate limits of agreement (LOA).

Results: Correlations between the two devices and sleep diaries were high for TST ($\rho = 0.64-0.74$) and lower for SE ($\rho = 0.29-0.47$) and WASO ($\rho = 0.27-0.45$). Bland-Altman analyses revealed the ring reported lower TST compared to actigraphy with a mean difference of -12.6 minutes (95% LOAs -134.0, 108.8). The ring detected lower SE than actigraphy (mean -9.1%, 95% LOAs -26.3, 8.0). Both devices reported lower TST (actigraphy: -28.0 min 95% LOAs -179.9, 123.8; ring: -35.8 min 95% LOAs -183.0, 111.4) and SE (actigraphy: -4.1% 95% LOAs -28.6, 20.3; ring: -12.8% 95% LOAs -33.9, 8.3) compared to self-report. PD participants were biased towards longer actigraphy TST relative to ring TST.

Conclusion: Devices agreed moderately for TST and differed most in SE estimates across cohorts. Both devices can be used for scalable, remote sleep monitoring in real world cohorts. Future studies should compare devices with polysomnography in aging clinical populations.

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0847

RECRUITING OLDER ADULT COUPLES FOR REMOTE RESEARCH: DIGITAL ADS AND COMMUNITY OUTREACH IN TANDEMChristian Escorcía¹, Wendy Troxel², Brian Baucom¹, Matt Euler¹, Bobbie Bermudez Bonilla¹, Mona Yaptangco¹, Carson Hernandez¹, Kelly Baron¹¹University of Utah, ²RAND Corporation

Introduction: Enrolling a diverse and representative sample of older adults in sleep research is critical to generalizability. The goal of this study is to describe lessons learned in recruitment for a remote sample of couples in which one partner has age-related cognitive decline, focusing on how recruitment strategies influenced inclusion of Spanish-speaking participants.

Methods: The Couples, Healthy Aging, Rhythms & Sleep (CHARMS) study is a fully remote longitudinal study of sleep and cognition among couples where one partner has age-related decline. Prospective participants completed an initial phone or online survey, then both partners completed the Modified Telephone Interview for Cognition (mTICS). Couples were eligible if one partner scored ≤ 31 and the other ≥ 32 . The protocol included mailed equipment for one night of respiration monitoring and seven days of actigraphy alongside text-based sleep diaries. Coordinators tracked recruitment source, screening outcomes, consent, and language, summarizing yield by source and demographics.

Results: The study enrolled 184 couples using a multi-pronged recruitment strategy. A total of 3,277 individuals initiated screening ($n = 368$ eligible). Meta ads generated the largest volume ($n = 1,339$; 242 eligible), followed by electronic medical record (EMR) recruitment ($n = 656$; 35 eligible), Center on Aging registries, and BuildClinical. Research Participant Advocates, community health workers (CHWs), and other sources contributed smaller yields. By contrast, among Spanish-speaking potential participants ($n = 203$), EMR recruitment, CHWs, and Meta ads all yielded similar amounts, with other sources yielding few leads. After screening, nineteen Spanish-speaking participants consented, with half ($n = 8$) recruited via CHWs and five via Meta ads, highlighting the contribution of CHWs to Spanish-speaking enrollment. Actigraphy adherence was high, with 92.4% providing ≥ 4 valid days and 82.4% completing the full 7-day schedule.

Conclusion: Expanding recruitment to include Meta ads and strengthening community-based approaches, particularly CHW outreach, enabled us to meet enrollment targets and improved engagement among Spanish-speaking participants. Remote, couples-based longitudinal studies may benefit from multi-pronged recruitment strategies that combine social media advertising with community-engaged methods. Budgeting for flexible recruitment, tracking recruitment source and language, and being prepared to adapt procedures over time may help improve enrollment, engagement, and representation.

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0848

CROSS-SECTIONAL AND LONGITUDINAL ASSOCIATIONS BETWEEN WATER MINERAL CONTENT AND SLEEP HEALTH IN UK BIOBANKQinyu Han¹, Jing Huang², Tingxuan Yang¹, Zixuan He¹, Sofia Liu³, Qian-Li Xue⁴, Junxin Li³¹Bloomberg School of Public Health, Johns Hopkins University,²California Pacific Medical Center Research Institute, ³School of Nursing, Johns Hopkins University, ⁴School of Medicine, Johns Hopkins University

Introduction: Sleep duration and quality are critical for health, yet the impact of environmental determinants on sleep, particularly drinking water quality, is underexplored. Using UK Biobank data, we aim to investigate the cross-sectional and longitudinal associations between water mineral content and self-reported sleep.

Methods: We analyzed three waves of UK Biobank data (T1: 2006–2010; T2: 2012–2013; T3: 2014–2018). Participants with complete data on all covariates were included, and sample sizes varied slightly across models due to variable availability. Sleep duration (hours/day), insomnia (yes/no), and daytime sleepiness (yes/no) were self-reported. Water mineral indicators included hardness (soft/moderately hard/hard), calcium carbonate (CaCO₃), calcium, and magnesium. Cross-sectional analyses (T1) used linear regression for sleep duration and logistic regression for insomnia and daytime sleepiness. Longitudinal analyses used generalized linear mixed-effects models with participant-level random intercepts in participants with ≥ 2 time points. Models adjusted for demographic, index of multiple deprivation, employment, income, chronic conditions, lifestyle, food intake of magnesium and calcium, and daily water intake (number of glasses).

Results: Cross-sectional analyses ($n = 24,135$ – $25,998$; mean age 55.6 ± 8.3 years; 50.3% female) showed that each SD (standard deviation) increase in water calcium (SD = 42.0 mg/L) was significantly associated with a 0.0126-hour (≈ 0.76 -minute) shorter sleep duration, while hardness categories, CaCO₃, and magnesium was not significant. Soft water was associated with higher odds of insomnia compared to hard water (OR = 1.12; 95% CI [1.05 to 1.20]), while each SD increase in water calcium was associated with lower odds of insomnia (OR = 0.92; 95% CI: 0.92–0.96). Water mineral concentrations showed no significant associations with daytime sleepiness cross sectionally. Longitudinally ($n = 24,011$ – $25,881$; mean age 55.6 ± 8.3 years; 50.3% female), moderately hard water was significantly associated with greater rate of increase in sleep duration over time compared with hard water ($\beta = 0.029$). No water mineral exposures were significantly linked with insomnia or daytime sleepiness changes over time.

Conclusion: Water mineral content showed modest associations with sleep outcomes in UK Biobank participants. These small effects warrant replication in specific populations and mechanistic studies before informing public health interventions or policy.

Support (if any): Johns Hopkins University Catalyst Award

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0849

EXPLORING THE ASSOCIATION BETWEEN EMPLOYMENT STATUS AND SLEEP ARCHITECTURE AMONG OLDER BLACK ADULTS

Elizabeth Mirabal¹, Brittany Larsen², Nina L'Houtellier¹, Aisha Coralie Severe¹, Jaden Rodriguez¹, Gabrielle Belony¹, Matthew Betancourt¹, Daniel Felipe Barba¹, Girardin Jean-Louis², Azizi Seixas²

¹University of Miami Miller School of Medicine, ²University of Miami

Introduction: Although prior studies suggest that employment status influences sleep duration, findings reported in the literature remain inconsistent. Little is known about how employment status relates to specific components of sleep architecture, particularly among older Black adults. This study aimed to assess whether sleep architecture and total sleep is differed by employment status (employed versus unemployed) among older Black individuals.

Methods: In a seven-day observational sleep study (NIH-funded MOSAIC), 100 older Black volunteers (72.7% females, ages 64.5±5.6 years) provided objective sleep data using a SleepImage ring (n=100) and Fitbit Inspire 2 (n=97). The SleepImage Ring captured total sleep time (TST), rapid eye movement (REM), and non-REM (NREM) duration, while Fitbit captured TST, light NREM (N1/N2), deep NREM (slow-wave sleep [SWS]), and REM duration. A baseline questionnaire captured demographic data, including employment status (yes/no). A linear regression analysis was conducted to examine the relationship between sleep architecture and employment status, controlling for age, sex, smoking history (yes/no), diagnosis of Obstructive Sleep Apnea (yes/no), marital status (single/married), and sleep medications (yes/no).

Results: Analysis of SleepImage ring data showed individuals who were employed had worse sleep parameters, namely duration of REM ($F[7,92]=2.41$, $R^2=0.16$, $p=0.03$) and TST ($F[7,92]=2.85$, $R^2=0.18$, $p=0.01$), compared with those who were unemployed. Specifically, being employed was linked to lower weekly REM ($\beta=-0.27$, $p=0.01$) and total ($\beta=-0.24$, $p=0.02$) sleep duration, whereas total NREM sleep duration showed no significant associations ($\beta=-0.19$, $p=0.07$). In contrast, analysis based on Fitbit data revealed significant differences in the proportion of SWS duration ($F[7,89]=2.32$, $R^2=0.15$, $p=0.03$). More specifically, older employed Black adults were more likely to have higher proportions of SWS, compared with their counterparts ($\beta=0.22$, $p<0.05$), but we found no significant associations with TST ($\beta=0.01$, $p=0.90$) or the proportions of light NREM sleep ($\beta=-0.15$, $p=0.16$) and REM sleep ($\beta=0.05$, $p=0.64$).

Conclusion: Employment status influenced the amount of TST, REM sleep, and SWS among older Black adults. These findings align with prior evidence linking social and occupational factors to sleep outcomes. Further research is needed to explore all factors that adversely affect sleep amounts in this population.

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0850

FEELING OLDER THAN YOU ARE: LINKS BETWEEN SUBJECTIVE AGE AND SLEEP OUTCOMES

Julia Boyle¹, Spencer Nielson², Hannah Bashian¹, Jennifer Moyer¹, Joseph Dzierzewski³

¹VA Boston Healthcare System, ²Virginia Commonwealth University, ³National Sleep Foundation

Introduction: Subjective age (i.e., age an individual feels), chronological age (i.e., years since birth), and age discrepancy (i.e., mismatch between subjective and chronological age) can play a role in overall health and survival. The present study sought to explore the association between age discrepancy and insomnia severity, sleep health, and sleep-related impairment across the adult lifespan.

Methods: Adults (N=3,177; Mage = 42.8; 49% female) completed an online survey, including demographic data (sex, race); subjective age (i.e., "How old do you feel?"); chronological age; sleep variables including the Insomnia Severity Index (ISI), RUSATED, Sleep Regularity Questionnaire (SRQ), and PROMIS Sleep-Related Impairment (PROMIS-SRI); depression (PHQ-2); anxiety (GAD-2); and self-assessed physical health (PHQ-15). Age discrepancy was calculated as subjective minus chronological age, divided by chronological age. Positive values indicated feeling older while negative values indicated feeling younger than chronological age. Correlational and regression analyses examined how age discrepancy was associated with sleep variables. A parallel mediation analysis explored whether age discrepancy was associated with self-assessed physical health indirectly through sleep variables.

Results: People who feel older than their chronological age also report more insomnia symptoms, more sleep-related impairments, lower sleep health, and lower sleep regularity (all p 's < .05). Age discrepancy was a significant predictor of all sleep variables even when accounting for chronological age, sex, race, depression, and anxiety. Age discrepancy had significant indirect effects on PHQ-15 scores through ISI, SRQ, and PROMIS-SRI scores (all CI's did not include 0). Specifically, higher age discrepancy was associated with increased insomnia symptoms, increased sleep-related impairment, and lower sleep regularity, which all were in turn associated with poorer subjective physical health.

Conclusion: Results suggest that the age you feel, not just the age you are, shapes sleep and health. Feeling older than your years predicts more insomnia, poorer sleep regularity, and greater sleep-related impairment, with downstream effects on physical health. These results reinforce the need to challenge negative perceptions of aging, not only in clinical care but also through education and public health messaging. Put simply, how old you feel is an important predictor of sleep and health across the lifespan.

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0851

LONGITUDINAL EFFECT OF RAPID-EYE-MOVEMENT SLEEP ON PLASMA ALZHEIMER'S DISEASE BIOMARKERS IN COGNITIVELY NORMAL OLDER ADULTS

Jeongyeon Hwang¹, Luisa Figueredo², Daphne Valencia³, Masrai Williams¹, Esther Blessing², Omonigho Bubu², Ankit Parekh¹, Korey Kam¹, David Rapoport³, Indu Ayappa³, Ricardo Osorio², Andrew Varga¹

¹Icahn School of Medicine at Mount Sinai, ²NYU Grossman School of Medicine, ³David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Associations between sleep architecture and change in plasma amyloid biomarkers have been only minimally evaluated, despite their advantages of high accessibility and safety when sampling. Here we examined the longitudinal effect of REM sleep on plasma beta-amyloid (A β) 42/40 ratio in cognitively normal older adults.

Methods: Sixty-four community-dwelling cognitively normal adults ages 55 to 90 were recruited at the NYU Alzheimer's disease research center. All participants completed a baseline polysomnogram and had repeated plasma collections 3.2 $\pm$ 2.0 years apart. Plasma A β 42 and 40 were measured via mass spectrometry (Araclon Biotech, Spain). Amyloid positivity was calculated with the Youden Index (A β 42/40 ratio $\leq$ 0.0992). We evaluated associations between %REM sleep and annualized changes in the plasma biomarker divided by year interval (Δ A β 42/40Post-Pre / year interval) using bivariate Spearman's correlation and generalized linear models with annualized changes in the plasma biomarker divided by year interval (Δ A β 42/40Post-Pre / year interval) as the dependent variable, after adjusting for age, sex, apolipoprotein ϵ 4 (APOE4) status, presence of OSA (AHI4% $\geq$ 5/hour), and the use of SSRI/SNRI's.

Results: Subjects were 66.7 $\pm$ 7.4 years old, 68.5% female, 57.4% Caucasian, 38.9 % APOE4 carriers, 18.5% amyloid positive, 46.3% with Apnea-Hypopnea Index 4% (AHI4%) $\geq$ 5, and 3.1% with SSRI/SNRI use. Total sleep time was 366.5 $\pm$ 83.3 minutes, REM sleep duration was 72.6 $\pm$ 31.1 minutes, and the percentage of REM sleep of total sleep time (REM%) was 19.4 $\pm$ 6.4%. Low REM% was significantly correlated with a high annual decline of plasma A β 42/40 ratio (ρ =0.31, p =0.013), though to reflect increased intracranial amyloid, and was associated with an annual decline of plasma A β 42/40 ratio, after adjusting for covariates (β =2.08, p =0.043). In a subgroup analysis, low REM% was significantly associated with a high annual decline of plasma A β 42/40 ratio in the A β positive group (β =3.20, p =0.033), but more weakly so in the negative group (β =1.52, p =0.14).

Conclusion: A low percentage of REM sleep might be an indicator of a faster accumulation of intracranial amyloid in cognitively normal older adults. This relationship was more strongly observed once amyloid pathology initiates, even before cognitive symptom onset.

Support (if any):

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0852

SEX DIFFERENCES IN THE ASSOCIATION BETWEEN SLEEP PROBLEMS AND PSYCHOLOGICAL WELL-BEING NINE YEARS LATER AMONG MIDDLE-AGED AND OLDER ADULTS

Fumiko Hamada¹, Monica Walters²

¹USF, ²University of Michigan

Introduction: Sleep problems are related to worse psychological well-being (PWB). Additionally, females have been shown to have greater sleep problems than males. However, less is known about the interplay between sleep problems and sex in relation to PWB. This study investigates the prospective association between sleep problems and PWB in middle-aged and older adults and whether sex moderates this association.

Methods: Data came from 574 middle-aged and older adults who participated in the Midlife in the United States study at two time points (T1: 2005-2006, T2: 2013-2017, Mage at T1=51.7, females=316). Participants responded via telephone to the Pittsburgh Sleep Quality Index (PSQI) and a 42-item PWB questionnaire (range=42-294; higher scores indicate better PWB). We used linear regressions to examine the prospective association between PSQI (T1) and PWB (T2), adjusting for sociodemographic and health covariates, including age, sex, education, current working status (working, not working, retired), partnered status (living with a partner or not), number of illnesses, and T1 PWB. We tested for moderation by including interaction terms between PSQI and sex.

Results: More sleep problems at T1 related to lower PWB at T2 (unadjusted: $B=-2.71$, $SE=0.38$, $p < 0.001$; adjusted: $B=-1.20$, $SE=0.30$, $p < 0.001$). Moderation analyses showed that the association between sleep problems and PWB differed by sex (overall interaction: unadjusted: $F=27.51$, $p < 0.001$; adjusted: $F=11.59$, $p < 0.001$). Specifically, in the unadjusted model, more sleep problems at T1 related to lower PWB at T2 more strongly for females ($B=-3.23$, $SE=0.45$, $p < 0.001$) than for males ($B=-2.00$, $SE=0.50$, $p < 0.001$). After adjusting for covariates, the association remained significant for females ($B=-1.63$, $SE=0.34$, $p < 0.001$) but not for males ($B=-0.44$, $SE=0.39$, $p=0.257$).

Conclusion: This study found that sleep problems have lasting negative effects on PWB over nine years, with stronger impacts among females. Our findings suggest that sleep problems are a key long-term risk factor for poorer well-being. Developing early, sex-specific sleep interventions may enhance psychological well-being. Future research should incorporate sex-specific metabolic biomarkers to better understand the mechanisms underlying sex-based differences.

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0854

SLEEP MEASURES AND ANXIETY AMONG OLDER ADULTS WITH TRAUMATIC BRAIN INJURY

Lauren Masino, Christine Johnston, Jennifer Albrecht, Emerson Wickwire

University of Maryland School of Medicine

Introduction: Traumatic brain injury (TBI) is a prevalent and serious injury among older adults, often resulting in adverse physical, cognitive, and mental health consequences. Insufficient sleep and poor quality sleep are also common following TBI and can negatively impact many of these same sequelae. The purpose of this study was to test the hypotheses that sleep duration and sleep quality at two weeks following TBI are associated with anxiety symptoms at three months following TBI among older adults with mild TBI.

Methods: Adults aged 65 and older treated for TBI within 72 hours of injury at trauma centers, emergency departments, and hospitals who provided informed consent were included. Subjective sleep was assessed via a standardized self-report sleep diary completed daily for one consecutive week, beginning two weeks following TBI. Sleep duration was defined as mean total sleep time, and sleep quality was defined as mean ratings from a ten-point rating scale (10=highest). Anxiety symptoms were assessed via the Hospital Anxiety and Depression Scale, administered three months post injury. Ordinal regression models examined the associations between sleep duration and sleep quality at two weeks following TBI and subsequent anxiety three months following TBI, controlling for age and sex.

Results: Participants included 108 older adults (mean age = 76.3 years, SD = 7.4). Ordinal regression analyses revealed no statistically significant association between sleep duration and anxiety (OR = 0.88; 95% CI: 0.70–1.11). However, sleep quality was significantly associated with anxiety symptoms, such that better sleep quality at two weeks was associated with lower odds of anxiety at three months following TBI (OR = 0.68; 95% CI: 0.52–0.89).

Conclusion: Sleep quality, but not sleep duration, is associated with anxiety among older adults with TBI. Future studies should employ multimethod assessment of sleep, including subjective and objective measures, among older adults with TBI. Interventions targeting sleep quality could be important for improving mental health outcomes in this population.

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0855

SLEEP AND CIRCADIAN RHYTHMS IN COMMUNITY-DWELLING OLDER ADULTS: DIFFERENCES BETWEEN MILD COGNITIVE IMPAIRMENT AND NORMAL COGNITIONMichelle Liu¹, Russell Calderon², Junxin Li²¹Putnam Associates, ²School of Nursing, Johns Hopkins University

Introduction: Sleep and circadian rhythms have long been proposed as early meaningful markers of cognitive decline, yet it is unclear whether patterns differ between older adults with mild cognitive impairment (MCI) and normal cognition. We

therefore investigated differences in subjective sleep measures and objective sleep and circadian parameters between community-dwelling older adults with and without MCI.

Methods: We analyzed baseline data from 195 participants enrolled in two clinical trials (NCT03959202; NCT05064007). Subjective sleep encompassed insomnia symptoms measured by the Insomnia Severity Index (ISI) and overall sleep quality measured using the Pittsburgh Sleep Quality Index (PSQI). Objective sleep included two nights of in-home EEG (Sleep Profiler™), which measured time spent in Stage 3 Non-Rapid Eye Movement sleep (NREM3) and the number of autonomic arousals during sleep. Additionally, circadian parameters derived from ≥3 nights of actigraphy included interdaily stability (IS), reflecting rest-activity patterns over several days, and intradaily variability (IV), capturing the degree of fragmentation within each day. Montreal Cognitive Assessment scores of 18–25 indicated MCI. A multivariate analysis of covariance (MANCOVA) tested group differences across all sleep and circadian measures adjusting for age, sex, and comorbidities. Significant findings were followed by FDR-corrected ANCOVAs.

Results: Participants were 69.7±6.7 years old, 78.9% female, 41.5% had MCI, had 2.0±1.5 comorbidities, and 46.7% reported insomnia symptoms (ISI>8). Cognitive status was significantly associated with the combined set of six sleep and circadian measures (Wilks' $\lambda=0.729$, $F(6,68)=4.21$, $p=0.001$, partial $\eta^2=0.271$). Follow-up ANCOVAs showed that individuals with MCI had higher IS, suggesting more rigid day-to-day activity rhythms ($p<0.001$, $pFDR=0.002$, partial $\eta^2=0.162$). MCI showed reduced NREM3 time, but this was not significant after FDR correction (partial $\eta^2=0.06$, $p=.042$, $qFDR=0.088$). No other measures remained significant after correction.

Conclusion: Our results suggest that individuals with MCI show more consistent daily circadian rhythms. However, the elevated stability may signal increased behavioral rigidity, potentially reflecting reduced lifestyle variability. Future longitudinal work is needed to determine whether these circadian features represent early behavioral changes that are linked to cognitive decline.

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0856

EXAMINING THE FIRST NIGHT EFFECT AMONG OLDER ADULTS WITH SLEEP DISTURBANCES, COGNITIVE IMPAIRMENT, AND DEPRESSIONMaamie Asamoah-Mensah¹, Brienne Miner², Anne Chen², Gawon Cho³¹Yale New Haven Hospital, ²Yale School of Medicine, ³Yale University

Introduction: Using electroencephalography-headband (HB) recordings over multiple nights, we examined the first night effect (FNE) among older adults with sleep disturbances undergoing polysomnography (PSG).

Methods: Ninety-five older adults reporting insomnia and/or daytime sleepiness ≥once/week wore a HB (Beacon Biosignals) for up to seven nights and completed one night of at-home PSG (Nox Medical). Participants also completed questionnaires, including assessments of cognition (Montreal Cognitive Assessment [MoCA]) and depression (Patient Health Questionnaire-8 [PHQ-8]). We compared total sleep time (TST) and wake after sleep

onset (WASO) from single-night polysomnography to averages from multi-night HB measures in all participants and among persons with abnormal MoCA scores or with depression. Paired t-tests in the full sample and within subgroups defined by cognitive impairment and depression were used to compare single-night PSG and multi-night HB measures of TST and WASO.

Results: The average age was 71.8 (SD 7.9) years, 47 (49.5%) were male, 54 (56.8%) were non-Hispanic White, 30 (31.6%) had abnormal MoCA scores, and 18 (18.9%) had depression. For all comparisons, there was no significant difference in measures of TST from single-night PSG vs. multi-night HB measures. WASO in the overall sample was significantly different (102 minutes on PSG vs. 73 minutes on multi-night HB; mean difference of 29 minutes [$p < 0.001$]). Among persons with abnormal MoCAs, PSG and multi-night HB WASO measures were 116 and 79 minutes, respectively ($p = 0.005$). In those with depression, single-night PSG and multi-night HB WASO measures were 118 and 73 minutes, respectively ($p = 0.001$).

Conclusion: Among older adults with sleep disturbances, first-night effects were not evident for total sleep time but wake after sleep onset was consistently lower on multi-night home EEG compared with single-night PSG, including among individuals with cognitive impairment or depression. These findings highlight that reliance on a single-night PSG may overestimate WASO in groups where sleep is more fragmented, potentially obscuring true sleep patterns. Multi-night home EEG offers a more representative assessment of nocturnal wakefulness and may improve diagnostic accuracy and treatment planning in patients with cognitive impairment or depression, for whom precise measurement of sleep is particularly important.

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0857

OSA TREATMENT WITH PAP REDUCES LOCUS COERULEUS-HIPPOCAMPAL RESTING-STATE FUNCTIONAL CONNECTIVITY ON 7T MRI IN COGNITIVELY NORMAL OLDER ADULTS

Korey Kam¹, Naomi Gaggi², Laurel Morris³, Daphne Valencia⁴, Sara Hishinuma¹, David Rapoport⁴, Indu Ayappa⁴, Ankit Parekh¹, Andrew Varga¹

¹Icahn School of Medicine at Mount Sinai, ²NYU Grossman School of Medicine, ³Mount Sinai and Nuffield Department of Clinical Neurosciences, University of Oxford, UK, ⁴David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: The locus coeruleus (LC) is a structure important in both sleep/wake regulation and memory/cognition but its resting state functional connectivity (FC) to memory-relevant structures as a function of OSA and its treatment has not been assessed.

Methods: Here, we examined the LC using 7T MRI with a computational LC localization and segmentation algorithm in 30 cognitively normal older subjects (55-85 yo): 17 with a new OSA clinical diagnosis ($AHI4\% \geq 5$) and 13 from the community without sleep complaints in which 5 had incidentally-identified OSA. Twelve of the OSA subjects elected positive airway pressure (PAP) therapy and returned 3-months later for a repeat 7T-MRI. Median PAP adherence was 4.3 ± 4.1 hours.

Results: Across most regions—including the right inferior parietal cortices, precuneus, and left inferior parietal cortex—individuals with OSA exhibited higher LC connectivity than their non-OSA counterparts, with small to moderate effect sizes (Cohen's $d = 0.28-0.39$). The largest difference between OSA and non-OSA subjects was observed in the right hippocampus, where LC-hippocampal FC was markedly greater in the OSA group compared to the non-OSA group (Fisher's z-score OSA: 0.025 ± 0.112 , non-OSA: -0.010 ± 0.091 , Cohen's $d = 0.66$). In 12 individuals with completed 7T-MRI scans both before and after 3-months of PAP use, there were significant regional differences in FC with the bilateral LC (seed-based connectivity). Regions included the right hippocampus, bilateral superior and inferior parietal regions, right medial temporal region, left precuneus. Specifically, the FC of the LC with the right hippocampus exhibited a significant reduction from untreated (baseline) to 3-months of PAP use ($pFDR \text{ corrected} < .05$, $k \text{ cluster size} > 50$).

Conclusion: LC resting state FC with anterior brain structures, particularly the hippocampus, is higher in subjects with OSA than without OSA, potentially suggesting LC hyperactivity. We present some of the first evidence that treatment of OSA through PAP can potentially decrease LC-hippocampus FC at rest, encouraging exploration of the functional impacts on memory.

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0858

DEVELOPMENT AND VALIDATION OF A PREDICTIVE MODEL FOR ICU NEEDS IN CHILDREN WITH SEVERE OSA AFTER ADENOTONSILLECTOMY: A PILOT STUDY

Dhillon Advano¹, Anna Wani², Ron Mitchell¹, Seckin Ulualp¹,
Truong Vu³, Daniel Rongo³

¹UT Southwestern, ²Children's Health, ³University of Texas at
Tyler School of Medicine

Introduction: To develop and evaluate a predictive model to risk-stratify pediatric patients with severe obstructive sleep apnea (OSA) undergoing adenotonsillectomy, identifying those requiring post-operative ICU stay based on pre-surgical characteristics and polysomnogram (PSG) parameters.

Methods: A retrospective review of 352 pediatric patients (< 18 years) who underwent adenotonsillectomy with an apnea-hypopnea index (AHI) > 40 on overnight PSG between 2021 and 2024 at a single children's hospital was conducted. Four machine learning models (Logistic Regression, Decision Tree, Random Forest, and XGBoost) were developed to predict post-operative ICU admission. Data was split into training (80%) and testing (20%) sets. A pipeline was created for preprocessing, including scaling, log transformation of continuous variables, and subsequent over-sampling via SMOTE to address class imbalance. Hyperparameters were optimized via randomized search with 5-fold cross-validation targeting recall. Model performance was assessed using area under the receiver operating characteristic curve (AUC-ROC), area under the precision-recall curve (PR-AUC), Recall, F1-score, Accuracy, and Precision. Feature importance and odds ratios were examined for interpretability.

Results: In a 72-patient test-cohort (8 ICU and 64 non-ICU), logistic regression identified higher OAH (OR=167.65, 95%CI 5.88–4775.52, p=0.003) and a positive respiratory viral panel (OR=22.35, 95%CI 4.47–111.64, p< 0.001) as risk factors for ICU stay. Protective factors included higher nadir oxygen saturation (SpO2 nadir; OR=0.08, 95%CI 0.01–0.55, p=0.01) and older age (OR=0.11, 95%CI 0.02–0.64, p=0.014). BMI-Z score was not a significant predictor (OR 3.19, 95%CI 0.20–51.75, p=0.41). Random Forest and Logistic Regression were top performers with AUC of 0.88 and 0.86, respectively. Random Forest was the best performing model (recall 75%; F1-score 0.48), followed by logistic regression (recall 75%; F1-score 0.41).

Conclusion: This pilot study validates the feasibility of using machine learning to risk-stratify pediatric OSA patients for post-operative ICU admission based on demographic and PSG predictors. The high recall and transparent explainability are key factors for fostering clinical trust. As a proof of concept, this work establishes a baseline, though predictive power is limited by the dataset size. Future models trained on larger multi-institutional datasets and validated in randomized trials may offer improved performance and generalizability, serving as tools to augment clinical decision making.

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0859

PREDICTORS OF RESIDUAL OBSTRUCTIVE SLEEP APNEA IN CHILDREN FOLLOWING ADENOTONSILLECTOMY

James Rooney¹, Hasnaa Jalou², Anuja Bandyopadhyay³, Harish Rao²

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¹Indiana School of Medicine, ²Riley Hospital for Children,

³Indiana University School of Medicine

Introduction: Obstructive sleep apnea (OSA) is the most frequently diagnosed pediatric sleep disorder, affecting 3-6% of the 74 million children in the US. Children with moderate to severe sleep apnea, defined by an Apnea-Hypopnea Index (AHI) score of 5.1 or higher, are candidates for adenotonsillectomy. Follow-up polysomnograms (PSG) are frequently ordered following adenotonsillectomy to determine further treatment. The objective of this study was to identify patient and PSG characteristics of children likely to have residual OSA (AHI>5) following adenotonsillectomy who benefit from repeat PSG.

Methods: In this single-center retrospective study, data was collected by reviewing the medical records and PSG REDCap database from 2021-2024. Patients aged 2-18 with two sleep studies; before and after adenotonsillectomy, and a baseline AHI of 5.1 or higher were included. The following variables: age, sex, race, BMI, neck circumference (NC), SpO2 Time< 90%, Total & REM AHI, desaturation index (DI), average and peak CO2 were evaluated.

Results: 370 patients met the criteria for the study, including 206 males and 164 females (median age of 6 years). BMIs pre-adenotonsillectomy ranged from 11-62.4 with a median of 18.6. Preliminary analysis shows that patient and pre-op PSG characteristics that predict AHI>5 post-op are older age, female sex, non-caucasian race, higher BMI, larger NC, higher total AHI and REM AHI, higher DI, lower nadir saturation, higher time< 90% SpO2, and higher peak CO2. Logistic regression models (adjusted for age, sex, and race) showed increased Odds Ratio of having AHI>5 with BMI, NC, Total and REM AHI, O2 nadir, SpO2 T< 90, DI, average and peak CO2. Further analysis is being performed to identify the AHI on pre-op PSG that will predict AHI>5 in the post-op PSG.

Conclusion: Follow-up PSGs are frequently ordered following adenotonsillectomy due to the absence of a standardized protocol that elucidates when follow-up PSGs are warranted with clinical benefit. This study helps determine if follow-up PSGs are warranted in children with OSA following adenotonsillectomy to reduce unnecessary repeat PSGs. As PSGs are expensive to perform and with limited access to Pediatric Sleep Centers across the country, this study will help reduce healthcare costs and improve access for all children.

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0860

A PEDIATRIC SLEEP PROGRAM'S EARLY EXPERIENCE WITH HYPOGLOSSAL NERVE STIMULATION FOR DOWN SYNDROME PATIENTS

Innessa Donskoy, Matthew Balog, Ayelet Snow, Darius Loghmanee
Advocate Children's Hospital

Introduction: Children with Down Syndrome (DS) have a high prevalence of obstructive sleep apnea (OSA), are at higher risk of residual OSA after adenotonsillectomy, and frequently struggle to tolerate continuous positive airway pressure (CPAP). FDA approval of hypoglossal nerve stimulation (HNS) for patients with DS ≥13 years in March 2023 opened a new care pathway. Our Pediatric Sleep Medicine department was an early adopter and developed a systematic method to assess HNS candidacy based on manufacturer inclusion criteria. Our initial experience identifying

and recruiting candidates offers insights into the benefits of and barriers to integrating HNS into care for this population.

Methods: We performed an electronic medical record (EMR) review of all pediatric DS patients seen in our Pediatric Sleep department from January 2019 to November 2025. Extracted data included demographics, polysomnography, surgical history, CPAP use metrics, Drug-Induced Sleep Endoscopy (DISE) findings, and HNS implantation, activation, and titration records. For patients who met inclusion criteria but declined HNS, clinic notes were reviewed to better understand decision-making.

Results: Across our institution, 1,326 pediatric DS patients were identified, 271 of which were seen by Sleep Medicine and had polysomnography. Among these, 184 had moderate (117) or severe (67) OSA. Adenoidectomy and/or tonsillectomy was performed in 161 cases. Seventeen patients underwent formal CPAP titration studies. However, CPAP compliance and efficacy data were available for 127, likely reflecting empiric Auto-CPAP initiation. DISE reports were available for 27 patients. Eight patients met all manufacturer inclusion criteria for HNS. Two proceeded with HNS implantation, activation, and titration, both reporting subjective improvement in sleep disordered breathing symptoms.

Conclusion: This review describes the experience of one of the earliest pediatric programs to integrate HNS into care for DS patients with persistent OSA. As expected, residual OSA after adenotonsillectomy was common and often led to CPAP use, with varied success. Early outcomes demonstrate that HNS offers a promising alternative for patients who struggle with CPAP and meet criteria. To better serve patients with DS and their families, our program is committed to continuing to learn about identification of candidates and deepening understanding of barriers to choosing this treatment modality.

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0861

HSAT DIAGNOSTIC PERFORMANCE IN IDENTIFYING RESIDUAL OBSTRUCTIVE SLEEP APNEA COMPARED TO POLYSOMNOGRAPHY IN CHILDREN POST ADENOTONSILLECTOMY

Mahalakshmi Somayaji¹, Yaelis Roman Rosado¹, Darko Stefanovski², Nancy Lin¹, Christopher Cielo¹

¹Children's Hospital of Philadelphia, ²University of Pennsylvania

Introduction: Obstructive sleep apnea (OSA) persists in up to 73% of children following adenotonsillectomy, yet post-operative OSA evaluation remains uncommon. Polysomnography is the gold standard for pediatric OSA assessment, but availability is limited. Home sleep apnea testing (HSAT) represents a potential alternative and is extensively validated in adult populations, though its accuracy in pediatrics remains underexplored. This investigation sought to determine the diagnostic concordance of HSAT with PSG for the diagnosis of OSA in children post-adenotonsillectomy.

Methods: In this prospective comparative effectiveness trial, children aged 5–12 years scheduled for clinical PSG to evaluate residual OSA following AT were recruited for comprehensive HSAT with electroencephalography in their home within one week of their clinical PSG. Obstructive apnea hypopnea index (OAH) derived from HSAT and PSG were compared using Spearman correlation and Bland-Altman analysis. Concordance in OSA classification was assessed using an OAH threshold of ≥ 2 and ≥ 5 events/hour.

Diagnostic accuracy was evaluated using nonparametric AUC ROC analysis at cutoffs of 1, 2, and 5 events/hour.

Results: Forty-nine children completed both HSAT and PSG, median (range) age 9.9 (5.6 – 13.2) years including 24 (49%) females, with comorbidities including asthma (50%), environmental allergies (42%), and obesity (17%). OAH based on PSG was 1.9 (0.1 – 33) events/hour. HSAT and PSG OAH correlated strongly (Spearman $r=0.74$, $p<0.0001$). Bland Altman analysis showed a mean difference of 0.9 events/hour ($SD=4.7$), with limits of agreement -8.2 to 10 . Using OAH cutoff of 2 events/hr, PSG identified OSA in 23 (47%) children, while HSAT identified 24 (49%). Relative to PSG, HSAT over-diagnosed 9 (18%) and under-diagnosed 7 (14%). At 5 events/hour, both modalities classified 16 (33%) identically, with minimal misclassification. AUC ROC analysis demonstrated excellent diagnostic accuracy: 0.8, 0.9, and 0.9 for cutoffs of 1, 2, and 5 events/hour, respectively.

Conclusion: Despite some night-to-night variability in OSA diagnosis at low OAH thresholds, comprehensive HSAT with electroencephalography shows strong concordance and excellent diagnostic accuracy compared with PSG for the diagnosis of OSA in children. These findings support consideration for use of HSAT for pediatric OSA evaluation following adenotonsillectomy, with the addition of electroencephalography potentially enhancing accuracy.

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0862

IS PORTABLE MONITORING A VIABLE ALTERNATIVE TO IN-LAB EVALUATION OF OSA IN MEDICALLY COMPLEX CHILDREN?

Alexandra Ables¹, Amanda Radtke¹, Zahari Tchopev², Ryan Matheson¹, Nolan Carlile¹, Jaclyn Faulk¹, H. Scheuller², Matthew Brock²

¹San Antonio Uniformed Services Health Education Consortium,

²Wilford Hall Ambulatory Surgical Center

Introduction: In-lab polysomnogram (PSG) remains the sole recommendation for evaluation of suspected obstructive sleep apnea (OSA) in children. While some studies have evaluated portable monitoring (PM) to diagnose OSA in children, few have evaluated PM in medically complex children for whom in-lab PSG may be a barrier to evaluation due to the increased family burden, as well as lack of in-lab resources and support for their advanced medical needs. This project sought to compare the results of in-lab PSG vs. PSG modified to mirror data obtained by PM for medically complex children to evaluate whether PM is a potential alternative in children for whom in-lab evaluation may be prohibitive.

Methods: In-lab PSGs from eight children with diagnoses of moderate to severe cerebral palsy who were referred to our academic Sleep Medicine Clinic from a multidisciplinary pediatric Complex Medical Care clinic, were scored using recommended pediatric PSG scoring criteria. The PSG montage was then modified to match a type III PM device (nasal pressure, respiratory effort, pulse oximetry, electrocardiogram, and body position). These modified records were then scored using pediatric AASM scoring criteria by a blinded board certified sleep medicine physician and compared to original in-lab results.

Results: Initial in-lab PSGs showed one patient without OSA, 3 with mild OSA, 2 with moderate OSA, one with severe OSA, and one with moderate central sleep apnea (CSA). When transitioned to PM montage, the absolute mean difference in AHI was 3.85/hr

(SD=3.65), no diagnoses of OSA were missed, 50% (3/6) with OSA maintained the same severity, 50.0% (3/6) had increased severity, and one changed from no OSA to mild OSA. The patient with moderate CSA was changed to severe mixed sleep apnea.

Conclusion: Our results thus far indicate that PM may be an option for OSA diagnosis in some medically complex children with barriers to in-lab PSG. However, the limited montage of PMs cannot adequately classify arousals or time awake, and may therefore over-estimate the degree of sleep apnea in medically complex children who may have respiratory issues during both sleep and wake at night. Concern for seizures or CSA can limit overall utility of PM.

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0863

MULTIDIMENSIONAL DETERMINANTS OF PEDIATRIC OSA SEVERITY: BASELINE CROSS-SECTIONAL ANALYSIS OF CLINICAL AND ANATOMICAL FACTORS

Yunyun Zhang¹, Lindsay H. Williams², Brian Kraft², Colette Cozean³, Clete Kushida⁴

¹The Affiliated Wuxi People's Hospital of Nanjing Medical University, Wuxi People's Hospital, ²The Vivos Institute, ³The EyeDeas Company, ⁴Stanford University

Introduction: To characterize pediatric obstructive sleep apnea (OSA) and identify the major determinants of anatomical and sleep-related factors associated with its severity.

Methods: A total of 79 pediatric patients with OSA diagnosed between May 2023 and December 2024 were included. Clinical characteristics, anatomical indices and sleep breathing habits were collected. Craniofacial and three-dimensional upper airway measurements were obtained via cone-beam computed tomography, with nasal resistance measured by NR6 Rhinomanometry. Group and within-group analyses were performed, followed by spearman correlation and multiple regression.

Results: Pediatric patients aged 3-14 years (40 females and 39 males; 44.3% with attention deficit disorders/attention deficit hyperactivity disorder (ADD/ADHD) symptoms or diagnosis) were classified as 22 mild, 36 moderate and 21 severe OSA, with no significant age differences among severity groups. Sleep study results showed that apnea duration variability index (ADVI) progressively increased from mild to moderate and severe groups ($P=0.000$), and rapid eye movement (REM) ratio similarly rose with OSA severity ($P=0.001$). Among anatomical indices, minimum airway area differed across groups ($P=0.01$), while overjet ratio was notably higher in severe cases among three groups ($P=0.04$). Spearman correlation analysis showed that 3%AHI was positively significantly associated with REM ratio, sleep fragmentation, AVDI, brachyfacial pattern, and oxygen-related indices (MinSpO₂, MaxSpO₂), as well as with 3% and 4% respiratory disturbance index (RDI) and oxygen desaturation index (ODI) measures (all $P<0.05$). Higher AVDI was also linked to poorer school performance, more nocturnal awakenings and transitions, and longer total sleep time (all $P<0.05$). Further multiple linear regression analysis was conducted to explore the potential factors to AHI. The model was significant ($F=8.97$, $P=0.001$, adjusted $R^2=0.55$). After adjusting for age, gender, and BMI using a stepwise approach, the ADVI ($\beta=5.85$, $P=0.02$), REM ratio ($\beta=18.99$, $P=0.03$) and soft palate length ($\beta=0.79$, $P=0.002$) remained a significantly positive effect to 3%AHI.

Conclusion: Elevated ADVI and REM ratio, and longer soft palate length were independently associated with higher 3%AHI. In addition, ADVI was also correlated with poorer learning and increased nocturnal wake transitions. This highlights their potential roles in assessing OSA severity, especially in pediatric patients with ADD/ADHD.

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0864

OBESITY IN PEDIATRIC SLEEP MEDICINE EVALUATIONS: INSIGHTS FROM A REAL-WORLD MULTICENTER ANALYSIS

Jeremy Landeo Gutierrez¹, Mariana Bedoya², Erin MacKintosh³, Julie Ryu¹, Rakesh Bhattacharjee¹, Maida Chen⁴

¹University of California San Diego, ²Vanderbilt University Medical Center, ³Seattle Children's Hospital/University of Washington School of Medicine, ⁴Seattle Children's Hospital/University of Washington

Introduction: Sleep disorders have been reported disproportionately among children with overweight/obesity, however, the exact prevalence of overweight/obesity in pediatric sleep clinics is poorly defined. Further, evidence on the burden of obesity among children undergoing evaluation in pediatric sleep medicine practices is lacking. We hypothesize that the prevalence of children and adolescents presenting with overweight/obesity to sleep clinics is higher compared to other pediatric subspecialty clinics across three large tertiary pediatric sleep centers.

Methods: Retrospective review of electronic health records of children under 18 years of age who had new patient visits with documented BMI at three tertiary pediatric hospitals (Rady Children's Hospital San Diego [San Diego], Seattle Children's Hospital [Seattle] and Monroe Carell Jr. Children's Hospital at Vanderbilt [Nashville]) across the following subspecialty clinics: sleep medicine, pulmonology, gastroenterology, endocrinology, and cardiology. A BMI percentile of ≥ 85 was used to define pediatric overweight/obese. Chi-square statistic was used to compare the proportion of children with overweight/obesity and obesity at each subspecialty clinic compared to those evaluated in the sleep medicine clinic. In sleep medicine clinics, chi-square tests were used to compare the proportions of overweight/obesity by age group (<5 years, 5-11 years, and ≥ 12 years).

Results: We retrieved a total of 223,840 new encounters from three pediatric tertiary hospitals (San Diego [$n=76,714$], Seattle [$n=57,863$], and Nashville [$n=89,263$]). The prevalence of overweight/obesity in sleep clinics was 55.5% in San Diego, 47.2% in Seattle, and 50.1% in Nashville. These prevalence rates were significantly higher than those in all other subspecialty clinics across all centers ($p\text{-value}<0.01$), including endocrinology (33.5-47.5%), pulmonology (35.5-38.7%), gastroenterology (30.1-34.8%), and cardiology (26.9-29.6%). An association between patient age range and overweight/obese status was also observed ($p\text{-value}<0.01$), with adolescents (>12 years old) having the highest rate of overweight/obesity (56.4-63.5%).

Conclusion: Our study reveals that pediatric sleep clinics evaluate a disproportionately high population of children with overweight/obesity. These findings support an opportunity for pediatric sleep specialists to create targeted intervention strategies to treat overweight/obesity.

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0865

SLEEP-DISORDERED BREATHING IN CHILDREN WITH ACHONDROPLASIA: A LONGITUDINAL ASSESSMENT OF POLYSOMNOGRAM RESULTS AND TREATMENT STRATEGIES

Amanda Belej, Connor Devoe, Seema Rani, Ricki Carroll, Mahim Jain, Aaron Chidekel, Abigail Strang
Nemours Children's Hospital

Introduction: Achondroplasia is the most common skeletal dysplasia. Children with achondroplasia are at risk for sleep-disordered breathing (SDB) throughout infancy and childhood. Polysomnogram (PSG) is recommended in infancy and as indicated clinically during childhood to screen for and manage SDB. The prevalence and progression of SDB and treatment strategies used over time are not well-described.

Methods: This IRB-approved, retrospective study describes polysomnogram results and treatment in a cohort of children with achondroplasia from 0-60 months managed from 2010-2025 at a pediatric referral center. All PSG were completed in an AASM-accredited laboratory at a single center; patients were included if baseline study was completed < 12 months of age. Clinical data, PSG results, and treatment strategies were obtained via chart review. Descriptive statistics were used to analyze results and compare treatment strategies by age.

Results: 74 patients (53% male, 81% white) met inclusion criteria. In the 0-6 month range, 85% had SDB with mean AHI 21.4(21.0), SpO₂ nadir 83.9(6.8)%, 2.7% with hypoventilation and most common treatments of watchful waiting (41%) and low-flow oxygen (31%). In the 7-12 month range, 74% with SDB with mean AHI 17.3(20.2), SpO₂ nadir 80.7(11)%, 9.5% with hypoventilation and most common treatments of watchful waiting (48%) and medical therapy (14%). In the 13-36 month range, 80% had SDB with mean AHI 20.6(20.5), SpO₂ nadir 82.0(12.5)%, 21.4% with hypoventilation and most common treatments of watchful waiting (43%) and ENT surgery (14%). In the 37-60 month range, 76% had SDB with mean AHI 14.8(17.1), SpO₂ nadir 85.2(5.7)%, 35.3% with hypoventilation and most common treatments of watchful waiting (58%) and positive pressure therapy (21%).

Conclusion: SDB was highly prevalent in this cohort of children with achondroplasia, predominantly OSAHS, with differences in OSAHS severity, ventilation, and treatment strategies by age. Although this cohort of referred children represents a population more likely to have SDB, repeat PSGs should be considered over time to evaluate for and manage SDB.

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0866

DECODING EXPIRATORY FLOW PATTERNS IN PRIMARY SNORING, PEDIATRIC OBSTRUCTIVE SLEEP APNEA AND LEIGH SYNDROME: NOVEL BIOMARKER OF BRAINSTEM DYSFUNCTION

Jia Ju Wang¹, Jessica Parker², Weston Powell³, Jan Ramirez², Maida Chen⁴

¹Children's National Medical Center, ²Seattle Children's Research Institute, ³Seattle Children's Research Institute, Center for Respiratory Biology and Therapeutics, ⁴Seattle Children's Hospital/University of Washington

Introduction: Breath-to-breath analytics have advanced characterization of obstructive sleep apnea (OSA), yet pediatric applications and expiratory dynamics remain understudied. Expiration may carry physiologic signatures of brainstem control, and Leigh syndrome (LS), a disorder with central respiratory dysfunction, provides a model to evaluate such abnormalities. We compared expiratory morphologies in children with LS, OSA, and primary snoring (PS).

Methods: With IRB approval, we conducted a retrospective study of baseline diagnostic polysomnography from seventeen PS controls, six LS patients, and eighteen AHI-sex-age-matched OSA patients. A breath-to-breath algorithm was created to quantify three expiratory morphologies (normal, ramp, pause) after removal of all scored apneas. Algorithm was written in C programming language and statistics were computed using Python.

Results: Age and sex distribution were similar across groups, and AHI did not differ between LS and OSA (13.3±5.3 vs 12.3±4.3, p=0.72). PS had the lowest AHI by design (1.82±0.69). Despite similar total expiration duration, LS had the shortest cycle period (CP), PS intermediate, and OSA the longest. Expiration-to-CP ratio was lowest in OSA (0.548±0.053s) versus LS (0.599±0.029s, p=0.036) and PS (0.602±0.019s, p<0.002), while the inspiration-to-CP ratio was highest in OSA, indicating an inspiratory-heavy pattern that did not by itself separate LS from PS. Expiratory morphology revealed clearer disease-specific signatures. Expiratory pause duration was shortest in PS (0.68±0.12s) compared with OSA (1.03±0.36s, p<0.001) and LS (0.94±0.41s, p=0.043) and pause-to-CP ratio was higher in LS and OSA than PS. Paused breaths were infrequent in OSA but common in LS and PS, whereas ramp breaths predominated in PS (76.9%±14.4%), were reduced in LS (46.6%±30.2%) and OSA (40.4%±21.8%), p=0.0082 and 1.5x10⁻⁶ respectively. LS showed increased ramp-to-CP ratios (0.321±0.058s) versus OSA (0.268±0.052s) and PS (0.259±0.041s, both p<0.05). Findings persisted even when including hypopneas and when restricting comparisons to mild OSA.

Conclusion: This is the first pediatric study examining novel expiratory dynamics across disease groups. Our results suggest that expiratory morphologies characterized by pauses and ramps may distinguish between PS, LS and OSA patients and are affected by both central and obstructive disease states. Expiratory mechanisms may therefore provide biomarkers of respiratory control integrity and reveal new exciting mechanistic pathways.

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0867

DEVELOPMENTAL TRAJECTORIES OF CHILDHOOD SLEEP DISORDERED BREATHING ASSOCIATED WITH ENDOTHELIAL FUNCTION AND ATHEROSCLEROSIS IN YOUNG ADULTHOOD

Julio Fernandez-Mendoza¹, Kaylee Rice², Anthony Rahawi², Abigail Stubenbort², Raegan Atha³, Susan Calhoun⁴, Alexandros Vgontzas², Duanping Liao², Edward Bixler², Jason Liao²

¹Penn State University, Hershey, ²Penn State College of Medicine, ³Penn State Health Sleep Research & Treatment Center, ⁴Penn State Health

Introduction: There are no lifespan epidemiological studies describing the developmental trajectories of sleep disordered breathing (SDB) in children as they grow into adults. No studies

have examined how the developmental trajectories of childhood SDB impact cardiovascular health in young adulthood.

Methods: A total of 698 participants from the Penn State Child Cohort, a randomly-selected population-based sample (52% female, 24% racial/ethnic minority), underwent in-lab polysomnography in childhood (5-12y), adolescence (12-19y), and young adulthood (20-32y) with a median follow-up time of 15y. Growth mixture models were used to classify the 698 individual trajectories of apnea/hypopnea index (AHI) into latent age-related classes (trajectories), while including sex, race/ethnicity, body mass index, and treatment (adenotonsillectomy or positive airway pressure therapy) as risk factors. Thereafter, we examined the association of the identified AHI trajectories with flow-mediated dilation (FMD) and carotid intima-media thickness (CIMT) in young adulthood, as measured by Doppler ultrasound.

Results: AHI showed four age-related trajectories: one with stable AHI from age 5 through 30 (85.8% of subjects), one with higher AHI at ages 5-10 that remained elevated through age 30 (7.5% of subjects), one with AHI that increased at age 13, peaked at age 16, and decreased after age 20 (3.4%) and one with AHI that increased at age 16 and continued to increase through age 30 (3.3% of subjects). Trajectories with highest AHI at critical developmental periods showed lower FMD ($p<.045$) and greater left and right CIMT ($p<.001$) at ages 20-32.

Conclusion: SDB shows well-delineated growth curves and developmental trajectories. Adolescent-onset SDB has the greatest impact on atherosclerotic cardiovascular health later in young adulthood.

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0868 DETERMINANTS OF THE DEVELOPMENTAL TRAJECTORIES OF SLEEP DISORDERED BREATHING FROM CHILDHOOD THROUGH YOUNG ADULTHOOD

Abigail Stubenbort¹, Kaylee Rice¹, Anthony Rahawi¹, Raegan Atha², Susan Calhoun³, Alexandros Vgontzas¹, Duanping Liao¹, Edward Bixler¹, Jason Liao¹, Julio Fernandez-Mendoza⁴

¹Penn State College of Medicine, ²Penn State Health Sleep Research & Treatment Center, ³Penn State Health, ⁴Penn State University, Hershey

Introduction: Given the lack of lifespan epidemiological studies describing the developmental trajectories of sleep disordered breathing (SDB) in children as they grow into adults, little is known regarding their lifespan risk factors.

Methods: A total of 698 participants from the Penn State Child Cohort, a randomly-selected population-based sample (52% female, 24% racial/ethnic minority), underwent in-lab polysomnography in childhood (5-12y), adolescence (12-19y), and young adulthood (20-32y) with a median follow-up time of 15y. Growth mixture models were used to classify the 698 individual trajectories of apnea/hypopnea index (AHI) into latent age-related classes (trajectories), while including sex, race/ethnicity, body mass index, and treatment (adenotonsillectomy [AT] or positive airway pressure [PAP] therapy) as risk factors.

Results: AHI showed four developmental trajectories. Female sex ($p=0.001$), racial/ethnic minority ($p=.0001$) and, to a lesser extent,

overweight ($p=.07$) and obesity ($p=.06$), predicted a trajectory with stable AHI from age 5 through 30 (85.8% of subjects). Female sex ($p=.08$) predicted a trajectory with AHI that increased at age 13, peaked at age 16, and decreased after age 20 (3.4%). Obesity ($p<.0001$) predicted a trajectory with higher AHI at ages 5-10 that remained elevated through age 30 (7.5% of subjects). Male sex ($p=.004$) and overweight ($p<.0001$) predicted a trajectory with AHI that increased at age 16 and continued to further increase through age 30 (3.3% of subjects). Neither AT nor PAP significantly predicted any of the trajectories.

Conclusion: Obesity is a key determinant of childhood-onset SDB and male sex and overweight of adolescent-onset SDB worsening through young adulthood. Female sex is associated with more favorable developmental trajectories, particularly that improving in the transition from adolescence to young adulthood.

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0869 BLACK CHILDREN REPORT GREATER SLEEP-RELATED IMPAIRMENT INDEPENDENT OF OBJECTIVE SLEEPINESS AND SLEEP-DISORDERED BREATHING

Ignacio Tapia¹, Ariel Williamson², Christopher Cielo³, Tiffani Johnson⁴, Candela Lang⁵, MaryAnne Cornaglia³, Ruth Bradford³, Winifred Chauvel⁵, Lisa Meltzer⁶

¹University of Miami, ²The Ballmer Institute for Children's Behavioral Health, University of Oregon, ³Children's Hospital of Philadelphia, ⁴UC Davis, ⁵University of Miami Leonard M. Miller School of Medicine, ⁶National Jewish Health

Introduction: Daytime sleepiness and functional impairment are common among youth with sleep-disordered breathing (SDB). The Multiple Sleep Latency Test (MSLT) objectively measures sleepiness, while the PROMIS Sleep-Related Impairment (SRI) scale captures perceived impacts of sleep problems on daytime functioning from child and parent perspectives. However, the relationship between objective sleepiness and the PROMIS SRI scores remains poorly understood in pediatrics, particularly across racial groups. We evaluated whether objective sleepiness and impairments differed between Black and White children with and without SDB and examined associations between MSLT sleep latency and PROMIS SRI scores.

Methods: This cross-sectional study included Black and White children aged 8-12 years with SDB and healthy controls. Participants underwent polysomnography, MSLT, and questionnaires. Robust linear regression models examined associations between MSLT mean sleep latency and PROMIS SRI T-scores, including race, study group, age, and relevant interactions.

Results: In total, 174 children, age 9.9 ± 1.4 years, 67% Black, MSLT mean sleep latency 15.5 ± 4.3 min, child-reported SRI 53.3 ± 10.2 , parent-reported SRI 52.7 ± 10.3 completed testing. Study groups were age-balanced, but the SDB group included significantly more Black children than controls. Child-reported PROMIS SRI scores showed no association with MSLT sleep latency ($\beta=0.001$, $p=0.983$). However, Black children reported significantly higher sleep-related impairment scores than White children ($\beta=20.5$, $p=0.038$), independent of objective sleepiness and SDB diagnosis. Parent-reported models revealed a significant SDB $\times$ MSLT latency

interaction ($\beta = -0.217$, $p = 0.014$), where longer MSLT latency was linked to lower SRI among children with SDB but not controls. This protective effect of a longer sleep onset latency was attenuated in Black children with SDB in a three-way interaction with race included ($\beta = 0.221$, $p = 0.031$).

Conclusion: Objective sleepiness shows minimal correspondence with child-reported sleep-related impairment, though Black children reported substantially more impairment than White children, regardless of SDB diagnosis. Parent-reported SRI was associated with objective sleepiness in children with SDB, with notable variation by race. These findings underscore the importance of integrating both subjective and objective measures when assessing sleep-related daytime functioning and investigating socioecological factors that may contribute to racial disparities in pediatric sleep health.

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0870

COGNITIVE, PSYCHOLOGICAL, AND DEVELOPMENTAL OUTCOMES OF CHILDREN WITH OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW AND META-ANALYSIS

Tanya Azar, Thien Nguyen, Abigail Frankenberg, Aarani Kamalanathan, Judy Mahmalji, Maria Ayoub, Asma Sodager, Bizuayehu Gelaye, Tracy Shields, Amir Gandjbakhche, Ashura Buckley
National Institutes of Health

Introduction: Pediatric obstructive sleep apnea (OSA) is a sleep-related breathing disorder marked by reduced or absent airflow despite ongoing effort to breathe. It affects children worldwide, with higher prevalence among those with obesity and neurodevelopmental disorders. Beyond cardiometabolic consequences, OSA has been increasingly linked to cognitive, psychological, and developmental challenges during critical stages of growth. This systematic review and meta-analysis synthesized existing evidence on cognitive, psychological, and developmental outcomes in children with OSA.

Methods: A total of 11,334 articles were identified through MEDLINE/PubMed, PsycINFO, and Embase. After screening, 404 underwent full-text review and 52 met eligibility criteria. Included studies focused on participants aged 0–18 with OSA diagnosed using American Academy of Sleep Medicine criteria. Standardized mean differences were calculated for cognitive outcomes (WISC), psychological outcomes (CBCL), and executive functioning (BRIEF).

Results: Across studies, pediatric OSA was associated with poorer verbal cognitive performance (WISC, effect size = -0.73 , 95% CI: -1.11 to -0.36), greater behavioral and emotional problems (CBCL, effect size = 2.26 , 95% CI: -0.29 to 4.81), and higher executive dysfunction (BRIEF, effect size = 1.90 , 95% CI: 0.13 to 3.67). These findings highlight consistent links between OSA and adverse neurocognitive and psychosocial outcomes in children.

Conclusion: Pediatric OSA is associated with meaningful impairments in cognition, behavior, and executive function. These results emphasize the need for early screening and targeted interventions to mitigate long-term developmental and psychological consequences.

Support (if any): This research was supported by the Intramural Research Program of the National Institutes of Health (NIH), including the NICHD and NIMH

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0871

DOES SEVERITY OF PEDIATRIC OBESITY PREDICT CHILDREN MOST AT RISK FOR SEVERE OBSTRUCTIVE SLEEP APNEA?

Lauren Castner¹, Megan Grekowicz¹, Da'Jhnae Gambrell-Sanders¹, Michael Ainbinder², Melodee Liegl¹, Amy Pan¹

¹Medical College of Wisconsin, ²Froedtert Medical Center

Introduction: Severe pediatric obesity has emerged as a major public health crisis. Obstructive sleep apnea (OSA) is present in up to 60% of obese children and adolescents. In the adult population, OSA screening tools incorporate body mass index (BMI); however, such tools do not exist for the pediatric population. We hypothesize pediatric patients with severe obesity, defined as BMI > 140th percentile of the 95th percentile, will have a significantly higher apnea-hypopnea index (AHI) > 15 when compared to patients with normal BMI (5th to 85th percentile).

Methods: We performed a retrospective chart review from January 2014 to December 2023 for all children, aged 6–18 years, who had a polysomnography (PSG) performed at Children's Wisconsin with an AHI > 15. Patients with craniofacial abnormalities, chromosomal disorders, chronic lung disorders, and neuromuscular diseases were excluded. For analysis, patients were divided into an obese BMI group and normal BMI group. Statistical analysis was performed using Fisher's exact test and Mann-Whitney test with p -value < 0.05 for significance level.

Results: We had 264 patients, 71% male, with a median (IQR) age of 12.9 (9.5–16.0) years at the time of sleep study. There were 23 (9%) patients with a normal BMI and 241 (91%) with an obese BMI with 52% of those with Class III obesity. The AHI ranged between 15.0–231.4. There was a trend towards a higher AHI with a higher class of obesity, $p = 0.052$. Tonsillar size was not a significant factor in leading to severe OSA. The higher the obesity class, the lower the national Child Opportunity Index (COI), $p = 0.007$ which indicates less access to quality resources affecting health outcomes.

Conclusion: This study demonstrates that as BMI increases, there is a trend towards severe OSA given the increased number of patients with Class III Obesity in our study population. When considering severe OSA, the presence or absence of tonsillar hypertrophy does not carry as much significance. There was a significant difference in COI scores between patients with higher BMIs and normal BMIs. The findings of this study may have clinical applications regarding patient education, determining need for split night PSG, and the urgency of testing.

Support (if any):

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0872

META-ANALYSIS OF DIAGNOSTIC TEST ACCURACY OF PEDIATRIC SLEEP QUESTIONNAIRE IN THE SCREENING OF PEDIATRIC OBSTRUCTIVE SLEEP APNEA

Olga Lacki¹, Imran Iftikhar²

¹Emory University, ²Emory University School of Medicine

Introduction: In this study we aimed to study the diagnostic test accuracy (DTA) of Pediatric Sleep Questionnaire (PSQ) in the diagnosis of obstructive sleep apnea (OSA) in children.

Methods: Studies reporting sufficient information to construct 2x2 confusion matrices were included. The diagnostic threshold AHI from PSG was AHI >1. Bivariate random-effects model was used to calculate mean sensitivity, specificity, positive and negative likelihood ratios (+LR, -LR), diagnostic odds ratio (DOR) and their 95% confidence intervals (CIs), summary receiver-operating curve (SROC), Fagan's nomogram and LR scattergram. Where reported, a pooled mean estimate of correlation between PSQ, and PSG-determined AHIs were computed.

Results: DTA meta-analyses included 4 studies. The bivariate weighted mean sensitivity and specificity pooled sensitivity, specificity, +LR, -LR and DOR of PSQ from 4 studies were 0.77 [0.62, 0.87], 0.42 [0.29, 0.55], 1.3 [1.1, 1.6], 0.56 [0.36, 0.88], 2.0 [1.0, 4.0], respectively. The area-under-the-curve in the SROC was 0.69 [0.65, 0.73]. +LR and -LR pairings were plotted a quadrant of LR scattergram that indicated the test was neither good for ruling-in nor for ruling-out OSA. With 43% prevalence of OSA in the pooled cohort of studies, Fagan's nomogram predicted OSA probabilities of 50% when the test is positive and 30% when the test is negative. The pooled Spearman's correlation coefficients between PSQ and PSG-determined AHIs was 0.18 (0.10; 0.25), $p < 0.001$, based on 8 studies.

Conclusion: As a screening questionnaire for pediatric sleep apnea, PSQ showed acceptable sensitivity but poor specificity. Further studies are required to assess the role of PSQ in screening for pediatric OSA.

Support (if any):

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0873

META-ANALYSIS OF DIAGNOSTIC TEST PERFORMANCE OF TYPE 3 HOME SLEEP APNEA TESTS AND PERIPHERAL ARTERIAL TONOMOMETRY STUDIES IN DIAGNOSIS OF PEDIATRIC OSA

Olga Lacki¹, Imran Iftikhar²

¹Emory University, ²Emory University School of Medicine

Introduction: The gold standard for the diagnosis of obstructive sleep apnea (OSA) in children is polysomnography (PSG). In this study, we aimed to study the diagnostic test accuracy (DTA) of type-III home sleep apnea tests (HSAT) and peripheral arterial tonometry (PAT) studies in children with OSA.

Methods: Studies reporting sufficient information to construct 2x2 confusion matrices were included. For type-III HSATs, bivariate weighted mean sensitivity, specificity, positive and negative likelihood ratios (+LR and -LR) were estimated using PSG apnea-hypopnea index (AHI) cut-offs >1, > 5 and > 10. For PAT studies, a univariate model was used for summary estimates. Concordance between PSG and type-III HSATs in OSA severity classification was assessed with Cohen's kappa.

Results: DTA meta-analyses for type-III HSATs and PAT studies included 6 and 2 studies, respectively. With the PSG AHI cut-offs of > 1/hour, > 5/hour and > 10/hour, mean sensitivity and specificity of type-III HSATs were 0.85 [0.66, 0.94] and 0.33 [0.03, 0.89], 0.88 [0.63, 0.97] and 0.93 [0.66, 0.99], and 0.65 [0.47, 0.80] and 1.00 [0.17, 1.00], respectively. The +LRs and -LRs using PSG AHI cut-offs of > 1/hour, > 5/hour and > 10/hour were 1.3 [0.5, 3.3] and 0.46 [0.05, 4.05], 12.4 [2.1, 72.6] and 0.13 [0.04, 0.46], and 197.9

[0.1, 308670.3] and 0.35 [0.21, 0.58], respectively. Pooled Cohen's kappa for concordance between type-III HSATs and PSGs for mild, moderate and severe severity of OSA were 0.36 (SE=0.19), 0.14 (SE=0.34), and 0.64 (SE=0.15), respectively. DTA meta-analysis for PAT studies using PSG AHI cut-off of > 5/hour, showed univariate pooled sensitivity and specificity of 0.94 [0.81, 0.98], and 0.95 [0.51, 0.99], respectively.

Conclusion: Diagnostic accuracy of type-III HSATs increases with increasing PSG AHI diagnostic thresholds, indicating that the test is only good for ruling-in but not for ruling-out OSA in children with high pre-test probability of severe OSA. Substantial agreement was noted between type-III HSATs and PSG in classifying OSA as severe but not in classifying OSA as mild or moderate. DTA meta-analysis on PAT studies showing high sensitivity and specificity, albeit based only on 2 studies, needs to be evaluated further with more studies.

Support (if any):

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0874

POPULATION-LEVEL PREDICTORS OF HABITUAL SNORING IN A U.S. NATIONAL PEDIATRIC COHORT: INSIGHTS FROM THE ABCD STUDY

Jeremy Landeo Gutierrez, Kay Rhee, Kelan Tantisira,

Rakesh Bhattacharjee

University of California San Diego

Introduction: The prevalence of pediatric Habitual snoring (HS, ≥ 3 nights/week) is highly prevalent among children in the U.S. Although adenotonsillar hypertrophy and elevated body mass index (BMI) are known risk factors for childhood sleep-disordered breathing (SDB), less is known on the contribution of modifiable sociodemographic and environmental factors in community-based populations. We hypothesize that sociodemographic and neighborhood characteristics are independently associated with HS in a large community-based pediatric cohort.

Methods: Cross-sectional analysis of the Adolescent Brain Cognitive Development (ABCD) cohort study of children aged 9-10 at baseline and on yearly evaluations 1-4. Predictors included sex, race/ethnicity, obesity (BMI percentile ≥ 95), environmental tobacco smoke exposure (ETS), and census-tract Childhood Opportunity Index (COI 2.0). HS derived from the Sleep Disturbance Scale for Children and compared to "no snoring" (snoring 0 nights/week). Statistical analyses utilized t-tests, chi-square tests, and stepwise logistic regression models, adjusting for relevant SDB covariates.

Results: At baseline, among 11,868 children (mean age 9.96 ± 0.62 years), 59% reported no snoring, 34.2% non-habitual snoring, and 6.8% HS. HS prevalence differed by race/ethnicity: 14.3% in NH-Black/AA, 7.9% in NH-Asian, 7.4% in Hispanics and 7.3% in NH-Other, compared to 4.3% NH-Whites ($p < 0.01$). Compared to children with no snoring, HS children were more likely to reside in low-to-very-low COI opportunity neighborhoods (43.9% vs. 25.8%, $p < 0.01$), had higher rates of obesity (33.2% vs 12.4%, $p < 0.01$) and ETS exposure (33.6% vs 19.2%, $p < 0.01$). In multivariable logistic regression models fitted separately for baseline through year 4 (adjusting for baseline sex, obesity, and ETS), low-to-very-low COI consistently predicted higher odds of HS across all time points (OR range 1.57–1.96), in addition to obesity (OR range: 2.68–3.02) and ETS (OR range 1.40–2.00). In models additionally adjusted for

race/ethnicity compared to NH-Whites, minority groups demonstrated elevated odds across the majority of time points: NH-Black/AA (OR range 1.84–2.93), NH-Asian (OR range 1.12–3.09), Hispanic (OR range 1.13–1.74), and NH-Other (OR range 1.40–1.73). **Conclusion:** Neighborhood-level characteristics and minority race/ethnicity were independently associated with HS in children. These findings underscore the importance of investigating population-level determinants of pediatric SDB to inform targeted prevention and equitable management.

Support (if any): Robert A. Winn Excellence in Clinical Trials Award

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0875

SLEEP DISORDERED BREATHING AND SLEEP ARCHITECTURE IN CHILDREN WITH VAGAL NERVE STIMULATION

Janki Naidugari¹, Cemal Karakas², Jawad Kahir³, Kelly Betz⁴, Emily Singer⁵, Egambaram Senthilvel³

¹Norton Healthcare, ²Children's National Hospital, ³University of Louisville School of Medicine, ⁴Norton Children's Hospital,

⁵University of Louisville

Introduction: This study aimed to characterize the effects of vagus nerve stimulation (VNS) on sleep architecture and sleep-disordered breathing using polysomnography (PSG) in children with drug-resistant epilepsy (DRE).

Methods: This was a retrospective study involving children with DRE/VNS who underwent PSG. We assessed the PSG differences between children with VNS/DRE and age, gender, BMI, and AHI-matched children without epilepsy. Obstructive sleep apnea (OSA) severity was categorized by obstructive apnea-hypopnea index as normal (< 1 event/hr), mild (1–4.9 events/h), moderate (5–9.9 events/h), or severe (≥ 10 events/h). Demographic data, VNS characteristics, sleep architecture, and distribution of respiratory events across sleep stages and body positions were collected and compared with matched-controls.

Results: Data from 28 children with VNS and 28 matched-controls were analyzed. In both groups, the median age was 12 years, 57.1% were female, and the BMI z-score was 1.1. Median AHI was 3.1 in the VNS group and 2.6 in the control group. The median age at VNS insertion was 7.5 years. The M106 was the most frequently used device model (51.9%). Among children with VNS, OSA was common: 28.6% had mild, 14.3% had moderate, and 21.4% had severe OSA. The VNS group spent less time in N1 sleep [3.8 (1.5–20.5) vs. 14.5 (8.5–25.5) minutes, $p=0.017$], more time in N2 sleep [270.0 (194.3–319.1) vs. 230.5 (183.5–238.7) minutes, $p=0.039$], and less time in REM sleep [42.0 (12.3–72.8) vs. 70.3 (56.5–89.8) minutes, $p=0.006$]. The overall maximum CO₂ level was slightly higher in the control group [50.0 (49.0–51.5) vs. 48.0 (44.0–50.5) mmHg, $p=0.041$]. None of the VNS stimulation parameters correlated with AHI, and there were no significant differences between groups in the distribution of respiratory events across sleep stages or body positions.

Conclusion: Our findings suggest that VNS in children with DRE is associated with meaningful alterations in sleep architecture and a high burden of sleep-disordered breathing, underscoring the importance of routine screening for OSA in this population. Incorporating formal sleep evaluations into the care of children receiving VNS may help identify treatable contributors to morbidity and optimize overall clinical outcomes.

Support (if any):

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0876

A 2-IN-1 WORKFLOW: AIO BREATHE PDS IMMEDIATELY CONTROLS OSA IN CHILDREN (6-17 YEARS) AND SEQUENTIALLY SUPPORTS MAXILLARY-MANDIBULAR-DENTAL GROWTH

Raghavendra Ghuge

Sleep Medicine Institute of TX

Introduction: US FDA cleared AIOMEGA®'s AIO Breathe® PDS (K252525) on 11/06/2025 for treatment of snoring and mild-to-moderate OSA in 6–17-year-old children. Under the direct supervision of a Dentist the device combines a sequentially customizable dental covering and flange-plateau technology for Adaptive Antero-Vertical Open Airway Therapy (AAVOAT™ for treatment of pediatric OSA in 6–17-year-olds and support of maxillo-mandibular-dental growth and development. This pediatric version shares identical design, engineering, and therapeutic technology as the adult device—offering a seamless adaptation to the pediatric patient population and the same benefits that it has provided in adults (18 and older). These benefits include CBCT scan proven immediate airway enlargement, sleep study proven greater than 95% success in OSA control and control of symptoms.

Methods: Sleep Physician performs evaluation and polysomnographic diagnosis of mild-moderate OSA and UARS in 6–17-year-old patients and refers appropriate patient (post-T&A or non-surgical, non-CPAP and CPAP-failure) to the Dentist. The Dentist completes evaluation, patient selection, tailors' treatment and places the patient on AIO Breathe® PDS. The dentist performs follow-ups (growth and development) at regular intervals, performs new scans and provides sequential devices to maintain treatment of OSA and to support maxillary-mandibular growth and development. The sleep physician performs OSA follow-ups and periodic sleep testing to confirm presence/control of OSA and symptoms. Multi-disciplinary team approach is maintained between physician-dentist throughout growth and development.

Results: AAVOAT™ (AIO Breathe® PDS) device provides immediate and ongoing control of OSA, and sequential ongoing support of maxillary-mandibular growth throughout childhood. Multi-disciplinary approach ensures best results for following changes in pediatric OSA. Permanent improvement or resolution of OSA in children is expected to occur with this approach as was previously observed with maxillary expansion in the Vivos study.

Conclusion: AAVOAT (Adaptive Antero-Vertical Open Airway Therapy) in treatment of OSA in 6–17-year-old children could be as effective as oral appliances in adults and CPAP in children. Supporting age-dependent maxillary-mandibular-dental growth while effectively treating OSA with the same device seems to be a reasonable non-invasive substitute and could improve the physical and neuro-cognitive growth of the next generation of children and adolescents with OSA.

Support (if any): AIOMEGA, LLC

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0877

ACCEPTABILITY AND PREFERENCE OF HOME SLEEP APNEA TESTING COMPARED WITH IN-LAB POLYSOMNOGRAPHY IN CHILDREN

Yaelis Roman Rosado¹, Mahalakshmi Somayaji¹, Nancy Lin¹, Darko Stefanovski², Christopher Cielo¹

¹Children's Hospital of Philadelphia, ²University of Pennsylvania

Introduction: In-lab polysomnography remains the diagnostic standard for evaluation of obstructive sleep apnea (OSA) in children, but is limited by cost, accessibility, and challenges of sleeping in an unfamiliar environment. Home sleep apnea testing (HSAT) may be an alternative option, yet acceptability and preference of HSAT versus polysomnography in children are unknown. This study compared parent and child-reported acceptability, usability, and preference of HSAT versus PSG following adenotonsillectomy (AT).

Methods: In this clinical trial, children aged 5-12 years referred for clinical polysomnography for evaluation of OSA post-AT were enrolled and randomized 1:1 to complete comprehensive HSAT with electroencephalography either before or after clinical in-lab PSG. Acceptability questionnaire data using a 5-point Likert scale to assess approval, appeal, and likability of HSAT were summarized. Parent and child responses regarding ease of HSAT use, test preference, and similarity to a typical night of sleep were compared using chi squared. Open-ended comments were analyzed for common themes regarding test experience.

Results: Forty-nine children participated (median age 9.9 years; 24 [49%] female). Regarding HSAT acceptability, 87% agreed it "met approval", 77% found it "appealing", and 81% "liked it". Parent preferences were evenly split (49% HSAT, 49% PSG), though most reported HSAT resembled a more typical night (71% versus 20%, $p < 0.0001$) and was easier (57% versus 35%, $p = 0.0018$). Children tended to prefer PSG (57% versus 39%, $p = 0.07$). Similarly reported HSAT resembled a typical night (59% versus 31%, $p = 0.005$) and ease of use (45% HSAT, 43% PSG). Qualitative comments highlighted HSAT comfort, convenience, and reduced hospital stressors, while PSG offered reassurance, technician support and perceived thoroughness, emphasizing real-time assistance with sensors and fewer issues with equipment removal.

Conclusion: Parents reported comprehensive HSAT as highly acceptable for the evaluation of OSA in children and more representative of a typical night of sleep, yet overall preferences for HSAT versus PSG were mixed, with reported trade-offs with each test. Although HSAT could be a family-centered alternative OSA evaluation in some children, the choice of test must be individualized to align diagnostic testing with family needs and preferences.

Support (if any): AASM Foundation

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0878

ASSESSMENT OF ACCESSIBILITY TO DIAGNOSIS OF PEDIATRIC OSA USING PORTABLE HOME SLEEP STUDY TESTING VERSUS IN-LAB POLYSOMNOGRAPHY

Jessica Ahn¹, Audrey Chikalla², Kiran Nandalike², Ambika Chidambaram²

¹University of California, Davis, ²University of California, Davis Medical Center

Introduction: Untreated pediatric obstructive sleep apnea (OSA) can cause significant morbidity, making timely diagnosis essential. In-lab polysomnography (ILP) is the gold standard but is often limited by availability and long waiting times. Our study aimed to assess accessibility to OSA diagnosis using a type III home sleep study (HST) compared to ILP.

Methods: We conducted a retrospective review of patients under 21 years who completed HST from May to October 2025. HST was ordered for children with high clinical suspicion for moderate to severe OSA. A group of similarly aged patients who underwent ILP during the same period was randomly selected. Demographics, comorbidities, sleep study parameters, and logistical metrics (time for authorization, study completion, and result review) were collected.

Results: Forty-seven patients were included (HST: 23 [female 9, male 14]; ILP: 24 [female 10, male 14]), median age of 9 years for HST [range 1-18 years] and 8.5 years for ILP [range 2-17 years]. HST group had a slightly higher prevalence of asthma (61% versus 42%), chromosome abnormalities (43 % versus 29%), autism (30% versus 20%), cardiac pathologies (26% versus 13%), and prematurity (22% versus 8%), whereas ILP group had higher prevalence of seasonal allergies (30% versus 38%) and obesity (22% versus 25%). The median time from order to study was 30 days (range 6 to 123 days) for HST and 143 days (range 84 to 231 days) for ILP; time to results was 44 days (range 16 to 145 days) for HST and 174 days (range 174 to 275 days) for ILP. OSA severity distribution for HST group: 1-primary snoring, 9-mild, 15-moderate, 5-severe versus ILP group: 0-primary snoring, 15-mild, 5-moderate and 4-severe. In the HST group, severity was likely underestimated for 8 (35%) patients since respiratory events could not be scored even with airflow limitation due to absence of electroencephalography signals.

Conclusion: HST improved access to diagnosis with a significant reduction in wait time to obtain the study as well as results even in children with significant co-morbidities. HST likely underestimated the severity of OSA for some. Further clinical guidelines are needed for the use of HST as a diagnostic modality in pediatric OSA.

Support (if any):

Abstract citation ID: zsag091.0878

0879

DEFINITION OF REAL-WORLD RESPONSIVENESS TO PAP USING HOME MONITORING IN CHILDREN WITH DOWN SYNDROME

Angela Guerrero Pena, Oscar Rodriguez, Iman Sami, Jenny Lew, Miriam Weiss, Maria Ortiz Vergara, Gustavo Nino
Children's National Hospital

Introduction: Evidence indicates that obstructive sleep apnea (OSA) is not only more prevalent but also might be more severe in children with Down Syndrome (DS). Multiple anatomical factors contribute to this susceptibility, including craniofacial abnormalities, obesity, and hypotonia. However, how these factors influence responsiveness to positive airway pressure therapy (PAP) in children with DS remains unclear. The goal of this study was to examine real-world responses using PAP home monitoring in children with DS diagnosed with OSA.

Methods: The study included PAP therapy data for 210 children, comprising 43 individuals with DS. Subjects ranged in age from 1 month to 18 years and had PSG-confirmed OSA. We collected demographic information, clinical variables, and PSG parameters for all participants. Individual responses to PAP therapy were assessed by comparing the apnea-hypopnea index (AHI) from the initial polysomnography with the mean AHI obtained from PAP device downloads. R programming and Multivariable models

(logistic regression) were employed to identify predictors of a positive PAP response.

Results: We observed excellent responses to PAP therapy in children with DS. Children with DS experienced a >75% AHI reduction of 88% versus 68% in the non-DS group ($p = 0.012$). The required PAP pressure was comparable between both groups (DS: 6.0 cm/H₂O vs. non-DS: 7 cm/H₂O, $p = 0.2$). Multivariable logistic regression analysis showed that > 75% AHI reduction on PAP were more pronounced in those with obesity, severe OSA (AHI >10/hour) and DS status.

Conclusion: We observed excellent responses to PAP therapy in children with DS. Children with DS experienced a >75% AHI reduction of 88% versus 68% in the non-DS group ($p = 0.012$). The required PAP pressure was comparable between both groups (DS: 6.0 cm/H₂O vs. non-DS: 7 cm/H₂O, $p = 0.2$). Multivariate logistic regression analysis showed that > 75% AHI reduction on PAP were more pronounced in those with obesity, severe OSA (AHI >10/hour) and DS status.

Support (if any):

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0880

EFFECTS OF OBSTRUCTIVE SLEEP APNEA ON BLOOD PRESSURE IN PEDIATRIC POPULATION

Rohan Bellary¹, Prasad Malavika¹, Ankita Nair¹, Janki Naidukari¹, Jawad Kahir¹, Michael Orangias¹, Karim El-Kersh², Egambaram Senthilvel¹

¹University of Louisville School of Medicine, ²University of Arizona School of Medicine

Introduction: Obstructive sleep apnea (OSA) is becoming increasingly recognized as a cause of pediatric hypertension through various mechanisms. Our aim of this study is to evaluate the impact of OSA on nocturnal blood pressure (BP) in children with OSA.

Methods: This study was a single-center retrospective analysis of children under 18 years old who underwent polysomnography (PSG) and had their blood pressure recorded before and after sleep studies. OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 1 event/hr), mild (1–4.9 events/h), moderate (5–9.9 events/h), and severe (≥ 10 events/h). BP was categorized as normal, elevated, or stage 1 or 2 hypertension (HTN) according to AAP 2017 guidelines.

Results: Eight hundred and six children who underwent PSG with recorded and pre- and post-PSG BP were analyzed. Primary snoring (group A), mild (group B), moderate (group C), and severe OSA (group D) were 39.5%, 25.4%, 12.8%, and 22.3%, respectively. BP categories were normal (50%, 44.9%, 36.9%, and 30.6%), elevated (16%, 15.6%, 18.5%, and 23.9%), stage I HTN (27.7%, 27.3%, 31.1%, and 33.9%), and stage 2 HTN (6.3%, 12.2%, 13.6%, and 11.7%) in each group. A significant dose-response relationship was observed between OSA severity and morning hypertension. Each 1-event/hour increase in AHI was associated with a 2% increase in the odds of hypertension (OR 1.02, 95% CI 1.01–1.03, $p < 0.001$), consistent across all adjusted models. Children with any OSA had nearly double the odds of morning hypertension versus non-OSA peers (adjusted OR 1.87, 95% CI 1.30–2.70, $p = 0.001$). When stratified by severity, mild OSA showed a nonsignificant trend (OR

1.25, 95% CI 0.84–1.86, $p = 0.27$), moderate OSA demonstrated attenuation after BMI adjustment, and severe OSA independently doubled hypertension risk across all models (fully adjusted OR 2.35, 95% CI 1.57–3.52, $p < 0.001$). The impact of BMI was the most significant confounding variable, especially diminishing correlations in moderate OSA.

Conclusion: Severe pediatric OSA independently doubles the odds of morning hypertension, demonstrating a clear dose-response gradient with apnea severity. These findings emphasize the clinical importance of early OSA detection and its management in children.

Support (if any): No Financial Disclosures

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0881

MATERNAL HOMELESSNESS AND INFANT SAFE SLEEP IN CALIFORNIA: TRENDS AND INEQUITIES FROM THE MIHA SURVEY, 2013–2021

Lourdes DelRosso¹, Mary Anne Tablizo²

¹University of California San Francisco, ²Stanford University

Introduction: Safe infant sleep practices reduce sleep-related deaths, yet disparities persist across demographic and socioeconomic groups. Maternal homelessness is a compounding risk. We examined trends and disparities in California using Maternal and Infant Health Assessment (MIHA) data from 2013 to 2021.

Methods: We calculated weighted prevalences with 95% confidence intervals (CIs) overall and by subgroups defined by race/ethnicity, maternal age, education, household income, and neighborhood poverty level. For each outcome- maternal homelessness, infant bedsharing, and back-to-sleep placement- we used binary logistic regression models that included the subgroup domain and time period to assess associations and temporal trends.

Results: Statewide, homelessness remained 3% across periods (2013–2015: 3.0%, 95% CI 2.6–3.4; 2016–2018: 3.4%, 3.1–3.7; 2019–2021: 3.4%, 3.1–3.7). Bedsharing declined from 34.6% (33.3–35.9) to 28.9% (28.0–29.7), while back-to-sleep rose from 80.3% (79.2–81.4) to 86.0% (85.3–86.7). In race/ethnicity domain models for bedsharing, odds in 2013–2015 were substantially higher in American Indian/Alaska Native OR 2.74 (95% CI 2.35–3.20), Black OR 2.99 (2.86–3.12), Asian/Pacific Islander OR 2.25 (2.18–2.33), and Hispanic OR 1.78 (1.73–1.83). Homelessness odds were lower in older groups: 20–34 y OR 0.42 (95% CI 0.33–0.54) and ≥ 35 y OR 0.25 (0.18–0.36). Bedsharing was less likely in older mothers (20–34 y OR 0.73, 0.69–0.78; ≥ 35 y OR 0.69, 0.65–0.74), whereas back-to-sleep was more likely (20–34 y OR 1.90, 1.81–1.99; ≥ 35 y OR 2.24, 2.13–2.35).

Conclusion: Conclusions: From 2013 to 2021, California showed improvement in safe sleep practices with reductions in bedsharing and increased adherence to back-to-sleep recommendations. However, pronounced disparities persisted across racial/ethnic groups and age-related categories. These inequities underscore the need for targeted, culturally responsive strategies to address the preventable burden of sleep-related infant deaths in California and similar settings.

Support (if any):

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0882

POLYSOMNOGRAPHIC OUTCOMES IN CHILDREN WITH ACHONDROPLASIA BEFORE AND AFTER ADENOTONSILLECTOMYAmanda Belej, Connor Devoe, Seema Rani, Ricki Carroll, Mahim Jain, Aaron Chidekel, Abigail Strang
Nemours Children's Hospital

Introduction: Obstructive sleep apnea hypopnea syndrome (OSAHS) is common in children with achondroplasia due to anatomic differences including midface hypoplasia. Although adenotonsillectomy is first-line therapy for OSAHS in children, less is known about outcomes of this surgical procedure in children with achondroplasia.

Methods: This IRB-approved, retrospective review examines polysomnogram (PSG) data from children with achondroplasia before and after adenotonsillectomy. Children were included in the analysis if they completed pre-and post-surgical PSG in the same AASM-accredited pediatric sleep laboratory between 2010 and 2025. Clinical and PSG data were obtained via chart review. Descriptive statistics were performed; two-tailed t-tests were calculated to compare respiratory indices before and after adenotonsillectomy.

Results: 22 patients (mean age 24.5 months, 50% male, 77% white) met inclusion criteria. Pre-surgical PSG with mean AHI 28.0(42.4) events/hour, OAI 6.1(8.0) events/hour, CAI 2.9(6.6) events/hour, SpO₂ nadir 76(17)%, 2.0(3.0)% of TST with SpO₂ < 90%, and 36% with hypoventilation. 73% of patients had AHI >10 events/hour. Post-surgical PSG with mean AHI 17.5(18.2) events/hour (p=0.07), OAI 4.8(11.8) events/hour (p=0.66), CAI 1.8(3.4) events/hour (p=0.01), SpO₂ nadir 85(8.5)% (p=0.01), 0.7(1.5) of TST with SpO₂ < 90% (p=0.08), and 32% with hypoventilation. 55% of patients with residual AHI >10 events/hour. There were no significant changes in sleep architecture between groups.

Conclusion: Adenotonsillectomy improves respiratory indices in children with achondroplasia; however, residual OSAHS and hypoventilation were common after surgery. Close clinical monitoring and repeat PSG after surgery are recommended for ongoing management.

Support (if any): None

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0883

STANDARDIZED SCREENING FOR OSA IN CHILDREN WITH ADHD IN THE OUTPATIENT CLINIC: A QUALITY IMPROVEMENT INITIATIVEAlexandra Ables¹, Zahari Tchoprev², Ryan Matheson¹, Peter Easter¹, Jaclyn Faulk¹, Nolan Carlile¹, H. Scheuller², Matthew Brock²¹San Antonio Uniformed Services Health Education Consortium,²Wilford Hall Ambulatory Surgical Center

Introduction: Obstructive sleep apnea (OSA) has an estimated prevalence of 2-5% in the general pediatric population. However, rates of OSA amongst children with attention deficit hyperactivity disorder (ADHD) are significantly higher, with an estimated prevalence of 20-30%. This is clinically significant as there is overlap between symptoms of OSA and ADHD, and untreated OSA can contribute to worsened behavioral and cognitive outcomes.

While there is no universally recommended tool for screening of OSA by the American Academy of Pediatrics (AAP) or American Academy of Sleep Medicine (AASM) for children with ADHD, both governing bodies recommend universal screening for OSA in this higher risk population. This quality improvement (QI) project aimed to standardize and increase screening for OSA in children with ADHD and increase the number of appropriate referrals to sleep medicine for OSA in these children by implementing tiered Plan-Do-Study-Act (PDSA) cycles.

Methods: Retrospective chart review was performed in August 2025 to establish baseline rates of screening for OSA in children with ADHD. The initial intervention instituted was to meet with outpatient pediatric providers to discuss the relationship between OSA and ADHD, with ongoing and subsequent PDSA cycles planned. Chart review cycles were performed in 3-week intervals to assess the efficacy of these interventions in increasing standardized screening and appropriate referral for OSA in children with ADHD.

Results: During baseline chart review of ADHD encounters from the outpatient pediatric clinic, 22% (8/36) of pediatric ADHD encounters specifically screened for OSA. Of these, 0 screened positive for OSA and none were referred to sleep medicine. After the first PDSA cycle, screening for OSA decreased to 12% (3/25), 0 screened positive for OSA and there were no referrals to sleep medicine.

Conclusion: This ongoing QI project suggests that diagnoses of OSA in children with ADHD are being missed due to low rates of standardized screening for OSA specifically. Low rates of screening for OSA led to zero referrals to sleep medicine at baseline and after the first intervention. Planned PDSA cycles to improve OSA screening and referral include implementing a standardized OSA screening tool, and standardized autotext in the electronic medical record for screening questions.

Support (if any):

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0884

TRAJECTORY OF OBSTRUCTIVE SLEEP APNEA (OSA) AND CENTRAL SLEEP APNEA (CSA) IN INFANTS WITH BRONCHOPULMONARY DYSPLASIA (BPD)Diana Larrain, Daniel Ignatiuk, Md Monir Hossain, Aisaku Nakamura, Narong Simakajornboon
Cincinnati Children's Hospital Medical Center

Introduction: Previous studies have shown that sleep disordered breathing (SDB) is common in infants with BPD. The extent to which BPD modifies the natural trajectory of SDB remains unclear. The aim of this study is to investigate longitudinal trends of OSA and CSA in infants with BPD compared to other infants from NICU.

Methods: This retrospective study in NICU patients from 2005-2025 who had ≥ 2 PSGs the first 24 months of life. Longitudinal changes in AHI, obstructive AHI (OAHI), central apnea index (CAI), REM% were analyzed at 0-3, 3-6, 6-12 and > 12 months. Mixed effects linear regression models were used for longitudinal changes in SDB indices and their interaction with BPD. Resolution of SDB (OAHI < 2/hr CAI < 5/hr) was evaluated using Kaplan-Meier methods.

Results: 930 infants with corresponding 2690 PSGs met the criteria for analysis. The cohort was divided into 2 groups (1) BPD (n=101,

10.9%), 62.4% male with a mean gestation age of 28.8 weeks (2 non-BPD group (n=829, 89.1%), 56.2% male with a mean gestational age of 37.3 weeks. AHI, OAHl and CAI declined significantly with increasing age in the entire cohort ($p < 0.0001$) and in the BPD group ($P < 0.0001$) with no effect of BPD on changes in SDB indices ($P=NS$). REM% declined with age in both BPD and non-BPD ($P < 0.0001$), but there was a trend toward slow reduction of REM% with age in the BPD group ($p = 0.058$). Kaplan-Meier demonstrated no significant difference in the timing of resolution of OSA between BPD and non-BPD infants (21.2[BPD] vs 20.6 months[non-BPD], log rank $p=0.09$). BPD infants showed slower resolution in CSA compared to non-BPD infants (6.4[BPD] vs 2.1 months[non-BPD], log-rank $p < 0.0001$).

Conclusion: In this cohort of NICU infants, there were significant reductions in both OSA and CSA with increasing ages in both BPD and non-BPD groups. Resolution of OSA occurred at a similar time in BPD and non-BPD infants, while slower resolution of CSA was noted in the BPD group. We speculate that delayed maturation of central respiratory control may contribute to prolonged resolution of CSA in BPD population.

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0885

TRAJECTORY OF SLEEP DISORDER BREATHING IN INFANTS WITH NEONATAL INTENSIVE CARE UNIT HISTORY

Diana Larrain, Melissa Cole, Md Monir Hossain, Aisaku Nakamura, Narong Simakajornboon
Cincinnati Children's Hospital Medical Center

Introduction: Sleep disordered breathing (SDB) is common among infants in the neonatal intensive care unit (NICU). Airway immaturity, respiratory control instability, craniofacial anomalies, neurologic disorders, increased time in REM sleep and prematurity may contribute to its pathophysiology. The natural progression of SDB including obstructive sleep apnea and central sleep apnea across in NICU infants remains undefined. This study aims to describe the longitudinal course of SDB in this population.

Methods: This was a retrospective study in NICU patients from 2005-2025 who had ≥ 2 polysomnograms (PSGs) within the first 24 months of life. The median and IQ range were calculated for AHI, obstructive AHI (OAHl), central apnea index (CAI), REM% and NREM% across four age groups: 0-3, 3-6, 6-12 and >12 months. Longitudinal changes in SDB indices over age were modeled using generalized linear mixed model with random intercept.

Results: A total of 930 infants with corresponding 2690 PSGs met the criteria for analysis. Of these infants, 57.9% (n=539) were male; mean gestational age 36.4 $\pm$ 3.7 weeks and mean birthweight 2.76 $\pm$ 0.88 kg. Comorbidities included genetic syndromes and craniofacial abnormalities (n=355), airway abnormalities (n=388), neuromuscular or neurological (n=136), cardiopulmonary conditions (n=296). The median AHI significantly decreased with increasing age (35 [0-3 months] vs 18.4 [3-6 months] vs 13.5 [6-12 months] vs 11.2 [>12 months]; $P < 0.001$). Similarly, the median OAHl significantly declined with increasing age (28.5 [0-3 months] vs 14.7 [3-6 months] vs 8.6 [6-12 months] vs 6.8 [>12 months]; $P < 0.001$). The median CAI decreased between 0-3 and 3-6 months ($P < 0.003$) with no further changes afterwards. Increasing age was associated with decreasing REM ($P < 0.001$) and corresponding increasing NREM ($P < 0.001$).

Conclusion: In this large cohort of former NICU infants, SDB severity decreased with age with a consistent reduction in AHI and OAHl in the first 2 years and a decrease in CAI in the first 6 months. Expected maturation changes of REM and NREM were noted in this cohort. Developmental changes of central respiratory control and airway growth may contribute to trajectory changes of SDB in this population.

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0886

SLEEP DISTURBANCES AND COFFIN-SIRIS SYNDROME

Maida Chen¹, Jade Turner², Weston Powell³, Samantha Vergano¹

¹Seattle Children's Hospital/University of Washington, ²Seattle Children's Research Institute, ³Seattle Children's Research Institute, Center for Respiratory Biology and Therapeutics

Introduction: Coffin-Siris Syndrome (CSS) is a rare congenital syndrome characterized by craniofacial dysmorphology, feeding and respiratory difficulties, hypotonia, and cognitive impairment. Sleep disturbances are a common concern for families, but no systematic description of sleep has been published. Our aim for this study was to provide an initial characterization of sleep disturbances in those with CSS.

Methods: Caregivers of children with CSS filled out online questionnaires including the Obstructive Sleep Apnea -18 (OSA-18), Children's Sleep Habits Questionnaire (CSHQ), Pediatric Sleep Questionnaire (PSQ), and PROMIS Sleep-Related Impairment and Sleep Disturbances. Collection was from July – September of 2025. Preliminary descriptive statistical analyses were done. Human subjects' approval was obtained through Seattle Children's Hospital with parental consent.

Results: There were 49 participants self-identified caregivers of children with CSS. Children were an average of 7.6 ~~XXX~~ 4.9 years, with 47% male, 84% white, 18% Hispanic. Most common genetic mutation involved ARID1B which was present in 53%. 94% of respondents had an OSA-18 score >36 suggesting at least mild impairment, while 22% scored >81 , consistent with severe impact. 62% scored above the clinical cutoff of 8 on the PSQ. 55% scored above the clinical cutoff of 41 on the CSHQ total score, with reported concerns for insomnia (sleeping too little, waking at least once overnight) happening 2 or more times a week in 50-71% of respondents. 86% reported restlessness and frequent moving during sleep at least 2 times a week, and 45% reported it occurred between 5-7 nights/week. Difficulty getting up in the morning and child seeming tired were also common 2 or more times per week in 48% and 64% respectively. 43% reported at least one prior sleep study being obtained. Parent-reported sleep disturbances and sleep-related impairment were high, with 92% and 88% reporting some degree of negative impact on quality of life.

Conclusion: Caregivers report high rates of sleep disordered breathing, restless sleep and insomnia symptoms in children with CSS, with significant impairments to quality of life. These findings highlight the need for improved clinical screening and treatments for sleep disorders in those with CSS.

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0887

WHEN “ADHD” WAS ACTUALLY SLEEP APNEA: A CASE OF BEHAVIORAL TRANSFORMATION IN A 6-YEAR-OLD BOY

Ahmed Saleh

Medical College of Wisconsin

Introduction: Background • Daytime behavioral concerns are a common presentation of pediatric OSA • Up to 25–30% of school-aged children labeled with ADHD may have undiagnosed sleep-disordered breathing • Early OSA identification prevents unnecessary stimulant exposure • Tonsillar hypertrophy remains the most common cause of OSA in otherwise healthy children Case Presentation • 6-year-old boy, previously healthy, no developmental delays • Referred for snoring and daytime hyperactivity, distractibility, emotional lability, decreased academic performance • Teacher Behavioral Report: significant inattention + hyperactivity • Parents noted nighttime mouth breathing, snoring “only on some nights,” and morning grogginess • Physical exam: o Tonsils: Grade 3 o Mallampati III o BMI 46th percentile o Mild nasal congestion but no allergic shiners

Methods: Diagnostic Testing: - Pediatric Sleep Questionnaire (PSQ): 0.52 (positive ≥ 0.33) - Pre-Intervention Polysomnography (PSG) • Total Sleep Time: 421 min • AHI: 7.9/h (moderate OSA) • Obstructive apnea index: 5.4/h • Hypopnea index: 2.5/h • Nadir SpO₂: 89% • REM AHI: 14.2/h • Arousal index: 16/h • Sleep efficiency: 87% Intervention Adenotonsillectomy (T&A) performed without complications at 6 years 2 months.

Results: Post-Op Polysomnography (8 weeks post-op) • Total Sleep Time: 438 min • AHI: 1.0/h (normal range) • Nadir SpO₂: 96% • Arousal index: 8/h • Sleep efficiency: 94% 3-Month Behavioral Follow-Up • Teacher report: dramatic improvement; no longer meeting ADHD criteria • Post-op Behavioral Assessment: within expected developmental norms • Parents’ quote: “He wakes up rested, listens better, calm and doesn’t interrupt others” • No stimulant therapy initiated

Conclusion: 1. Always examine the oropharynx in children with ADHD-like symptoms. 2. OSA is treatable and often curative with adenotonsillectomy. 3. PSG remains the gold standard for diagnosis and follow-up. 4. Simple cases like this remind us why sleep history matters in every pediatric visit.

Support (if any):

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0888

ADHERENCE TO NON-INVASIVE VENTILATORY SUPPORT IN NEURODIVERSE CHILDREN WITH SLEEP DISORDERED BREATHING

Audrey Chikalla, Ambika Chidambaram, Kiran Nandalike

University of California, Davis Medical Center

Introduction: In January 2024, our sleep center established a respiratory therapist (RT) driven clinic to improve adherence to non-invasive mode of ventilation (NIV) in children with sleep disordered breathing (SDB), predominantly focusing on neurotypical (NT) children. In 2025, we expanded our focus to address adherence challenges in our neurodiverse (ND) children.

Methods: Patients were followed at 4-week intervals for at least 3 visits and then on set intervals based on their progress. Desensitization plans were individualized to the child’s needs (mask or pressure acceptance) and routine. Our database included demographics, number of RT clinic visits, adherence based on insurance compliance requirement versus average number of hours of use per night. Severe obstructive sleep apnea (SOSA) was defined as apnea-hypopnea index of more than 10 events/hour.

Results: 74 patients (males 34, females 40; ages ranging from 7 months to 21 years) were seen in our clinic. There were 42 patients in the NT group and 32 patients in the ND group. Trisomy 21 was the most common co-morbidity in the ND group. Total number of RT visits was 166 (92 for NT; 74 for ND). In the NT group, 21 (50%) were adherent and 21 (50%) were non-adherent. In the ND group, 22 (68.7%) were adherent and 10 (31.3%) were non-adherent. Among the adherent NT group, average number of visits was 1.04 visits (range 1-5 visits); among the adherent ND group, average number of visits was 2.31 (range 1 to 6 visits). In the NT group, 20 (47.6%) patients had SOSA and 12 (60%) were adherent. In the ND group, 19 (59.3%) patients had SOSA and 13 (68.4%) were adherent. Two ND patients were successfully desensitized but did not achieve adherence.

Conclusion: In our center, ND children achieved better compliance with NIV compared to NT children but required twice the number of RT visits to achieve compliance. OSA severity did not affect adherence between the groups. In our experience, caregivers of ND group were more willing to implement and modify routines to improve adherence. We aim to further explore the potential modifiable factors in our future studies to improve adherence across both groups.

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0889

SLOW-WAVE ACTIVITY DECAY AS A NEUROPHYSIOLOGICAL MARKER OF PEDIATRIC SLEEP-DISORDERED BREATHING

Gary Garcia-Molina, Tamara Taporoski, Camilla Matthews,

Bethany Peterson, Stephanie Jones

University of Wisconsin, Madison

Introduction: Slow Wave Activity (SWA; EEG power 0.5–4 Hz) reflects sleep pressure and homeostatic regulation. In healthy sleep, SWA declines across the night as sleep pressure dissipates. Pediatric sleep-disordered breathing, including obstructive sleep apnea (OSA), may disrupt this process, yet traditional severity metrics such as Apnea-Hypopnea Index (AHI) fail to capture neurophysiological impact. We hypothesized that SWA dynamics, modeled as exponential decay, would reveal region-specific disruptions associated with respiratory event severity.

Methods: We analyzed overnight polysomnography from 52 children (ages 4–11 years) with varying OSA severity (AHI range: 0 to 36 event/hour). High-density EEG was segmented into artifact-free NREM epochs, and SWA was computed for frontal and posterior channels. SWA decline was modeled using an exponential function: $SWA(t) = A \cdot \exp(-Bt) + C$, where $A(>0)$ = initial amplitude, $B(>0)$ = decay rate, C = asymptote. SWA sampling strategies to fit the exponential function included uniform and non-uniform techniques. Both approaches considered windows of analysis of 20, 30, and 60 minutes. Linear regression models predicted apnea-hypopnea index (AHI), obstructive apnea index (OAI), and

hypopnea index (HI) from regional SWA decay parameters (for frontal and posterior sites), controlling for age and gender (18 models: 3 window sizes $\times$ 2 sampling methods $\times$ 3 outcomes).

Results: Non-uniform sampling outperformed uniform sampling across all outcomes. Models using 20–30 min non-uniform windows explained up to 56% of variance in HI (Adjusted $R^2 = 0.47$ – 0.56), whereas OAI models showed negligible explanatory power. Posterior decay rate (back B) was the most consistent predictor: slower SWA dissipation (greater B) was strongly associated with higher AHI and HI ($\beta = -7.55$ for HI, $p < 0.001$). Associations with frontal parameters were weak and inconsistent. Hypopneas exhibited stronger associations with SWA disruption than apneas, suggesting partial airway obstruction exerts greater impact on sleep homeostasis.

Conclusion: Modeling of SWA decline reveals clinically relevant disruptions in pediatric SDB beyond conventional metrics. Slower posterior SWA decay indicates impaired homeostatic recovery and correlates with apnea severity, particularly hypopneas. Non-uniform sampling enhances model performance, supporting its use in future research. SWA-based metrics may complement AHI to better characterize neurophysiological burden and guide treatment decisions in pediatric populations.

Support (if any):

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0890

PARTICIPANT BACKGROUND CHARACTERISTICS ON PEDIATRIC OBSTRUCTIVE SLEEP APNEA CLINICAL TRIALS

Rasa Tiano, Shayna Salerno, Jayden Marquez, Rakesh Bhattacharjee, Jeremy Landeo Gutierrez
University of California San Diego

Introduction: Adequate representation of the US population in clinical trials is essential to ensuring generalizability of findings and advancing equitable care. Despite obstructive sleep apnea (OSA) being one of the most common chronic conditions in children, the US population is not adequately represented in medical research. The extent of population background reporting and whether study participants reflect the US population has not been evaluated for pediatric OSA trials. We hypothesize that current OSA clinical trials insufficiently reflect the diversity of the general population, thereby limiting the applicability and equity of their findings.

Methods: Cross-sectional study of US-based clinical trials registered on ClinicalTrials.gov that enrolled participants aged < 18 years old between October 2007 and October 2025. We included US-based trials with a “completed study” status and with “available study results” only. We calculated the Enrollment-Census Difference (ECD), defined as the percentage point difference between the proportion of trial participants and the 2019 US Census pediatric population for each racial/ethnic group. One-sample Wilcoxon signed-rank test was performed to determine if the median ECD deviated significantly from 0, indicating parity.

Results: 23 studies met the inclusion criteria; 65.2% ($n=15$) reported race, and 56.5% ($n=13$) reported ethnicity (all of the

latter reported race simultaneously). 91.3% ($n=21$) were sponsored by academic centers, and 2 by industry. Among the studies reporting race and ethnicity data, the median proportional enrollment was 64.0% (IQR: 34.2–72.4%) for Whites, 21.1% (IQR: 13.3–54.0%) for Black/African Americans, 6.7% (IQR: 0.0–45.5%) for Hispanics, 1.6% (IQR: 0–4.9%) and 0% (IQR: 0–0%) for American-Indians/Alaskan-Natives. Analysis of ECD revealed white participants were over-represented (median difference +32.06% [IQR: 1.80, 40.04]; p -value < 0.01), while Asian (median -3.33% [IQR: -5.00, -0.09]; p -value < 0.01) and American-Indian groups/Alaskan-Natives (median -1.00% [IQR: -1.00, -1.00]; p -value $< .01$) were significantly under-represented. Hispanic populations showed a trend of underrepresentation (median -18.08%; p -value=0.31), while Black participants showed a tendency toward overrepresentation (median +7.70%; p -value=0.05); however, neither difference reached statistical significance.

Conclusion: Our study identified a significant underrepresentation of US populations of varied backgrounds in pediatric OSA clinical trials. These gaps highlight a need for population-level recruitment frameworks, and evidence-based policy-driven strategies to enhance inclusion in pediatric OSA research.

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0891

PARTICIPANTS' EXPERIENCES OF A MINDFULNESS-BASED INTERVENTION TO IMPROVE CPAP ADHERENCE IN ADOLESCENTS WITH SLEEP APNEA: A QUALITATIVE STUDY

Chun Ting Au, Emily Brinovec, Rianna Sarbajna, Sanjana Raja Rao Nagaraj, David Benzon, Adele Baker, Jessica Hildebrandt, Shania Sheth, Sara Ahola Kohut, Indra Narang
The Hospital for Sick Children

Introduction: Obstructive sleep apnea (OSA), characterized by intermittent upper airway blockage during sleep, is a common disorder in children. Continuous positive airway pressure (CPAP) is the standard treatment for OSA, with its effectiveness relying on nightly use during sleep. However, adherence to CPAP among adolescents is often poor, leading to under-treatment and potential chronic health issues. Prior studies suggest that higher dispositional mindfulness correlates with better CPAP adherence in adults. Mindfulness-based interventions (MBI) have been linked to improved health in adolescents with chronic illnesses, but their effectiveness in improving CPAP adherence is unknown. This study aimed to explore adolescents' experiences and perceptions of their participation in the MBI program.

Methods: This qualitative study was a part of a two-arm randomized controlled trial evaluating the effectiveness of a 4-week online MBI program versus a peer-support program in 33 adolescents with OSA using CPAP. Semi-structured interviews were conducted post-intervention and four weeks later. Interviews were transcribed and analyzed using Braun and Clarke's thematic analysis framework. Independent coding was performed by two researchers, with themes developed collaboratively.

Results: Ten participants in the MBI arm, each with two interviews, were included in this preliminary analysis. Participants

reported overall satisfaction with the program, valued social connections with peers, and appreciated learning mindfulness techniques that helped improve mood, stress, and anxiety. However, most did not perceive a direct impact on their CPAP use. Suggestions for improvement included increasing group size and incorporating more discussion about CPAP and OSA.

Conclusion: These interviews reveal the benefits of MBI on adolescents with OSA using CPAP, including positive psychosocial impacts. They also suggest areas for enhancing the delivery of MBI, particularly regarding logistical challenges and curriculum structure.

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0892

DIM LIGHT SALIVARY MELATONIN ONSET IN AUTISTIC CHILDREN USING AN IN-HOME PROTOCOL

Briana Taylor¹, Kahsi Pedersen², Erin Riddell¹, Althea Kastelic¹, Yasmin Andalib¹, Susan Santangelo²

¹Northeastern University, ²MaineHealth Institute for Research

Introduction: Sleep problems and irregular circadian rhythms are common in autistic youth, yet few studies have evaluated dim light melatonin onset (DLMO), the gold-standard measure of circadian phase, in this population. This study assessed the feasibility of an in-home DLMO protocol with autistic youth and examined associations between DLMO timing, sleep patterns, endogenous melatonin production, and child characteristics.

Methods: Twenty-eight autistic youth ages 8–17 years old completed an in-home DLMO protocol beginning at 4:30pm and ending at 10:00pm. Blackout curtains were installed to maintain ambient light < 50 lux across the protocol. Saliva samples were collected every 30 minutes and assayed via radioimmunoassay. Participants wore a Fitbit continuously for one week, and caregivers completed validated questionnaires on sleep and behavior.

Results: Of the 28 participants, DLMO could be calculated for 12; 5 participants showed chronically low melatonin levels (< 4 pg/mL at every sampling time), and 8 had consistently high melatonin levels (>4 pg/mL throughout). Three participants were unable to produce sufficient saliva for assay. For the 12 participants with a calculable DLMO, the mean DLMO was 6:35pm (SD=78 minutes). Later DLMO was associated with older age ($r=0.83$, $p<0.001$), lower caregiver-reported sleep anxiety ($r=-0.67$, $p=0.018$), later caregiver-reported sleep midpoint on non-school days ($r=0.77$, $p=0.003$), later Fitbit-derived sleep midpoint ($r=0.66$, $p=0.026$), and greater intraindividual variability in Fitbit-derived sleep midpoint ($r=0.69$, $p=0.020$). Differences emerged between endogenous melatonin production groups. Compared to children with normal or high melatonin levels, those with low melatonin at each sampling point demonstrated lower intellectual functioning ($F=7.05$, $p=0.01$), more caregiver-reported nighttime awakenings ($F=5.68$, $p=0.03$), and more sedentary behavior based on Fitbit data ($F=4.16$, $p=0.05$).

Conclusion: In-home DLMO assessment appears feasible for many autistic children, though substantial variability in endogenous melatonin production may limit the ability to derive circadian phase for a large subset of participants. Consistent with non-autistic youth, later circadian phase correlated with older age and

later sleep timing. Differences observed in children with chronically low melatonin levels highlight a potentially meaningful subgroup, but replication is needed. Overall, these findings support continued evaluation of circadian phenotyping as a possible tool for tailoring sleep interventions in autism.

Support (if any): R00HD102586

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0893

FAMILISMO AS A FRAMEWORK FOR PROMOTING ADOLESCENT SLEEP HEALTH: A FAMILY-BASED BEHAVIORAL INTERVENTION PILOT

Suzanne Gorovoy¹, Dora Valencia², Abdullah Alnafe³, Nandini Adusumilli³, Mia Sponseller¹, Edlin Hernandez⁴, Sylvia Ochoa⁴, Dagmara Dimitriou³, Ann Skulas-Ray², Michael Grandner²

¹University of Arizona College of Medicine, ²University of Arizona, ³University College London, ⁴Mariposa Community Health Center

Introduction: Sleep health is influenced by family routines and relationships, yet few interventions have explicitly targeted family systems as a pathway to improving sleep. Rooted in the cultural value of “familismo” — emphasizing family connectedness, support, and collective well-being — the FAMILISMO intervention was developed to promote family-level sleep and nutritional health through culturally grounded parent-adolescent sessions. This study reports implementation and preliminary sleep outcomes from the initial FAMILISMO trial.

Methods: Fourteen parent-adolescent dyads (adolescents aged 13–17) participated in a six-week telehealth program integrating sleep education, environmental optimization, and collaborative goal-setting around routines and technology use. Pre- and post-intervention assessments included standardized measures of sleep quality (Pittsburgh Sleep Quality Index; PSQI), insomnia severity (Insomnia Severity Index; ISI), daytime sleepiness (Epworth Sleepiness Scale; ESS), and sleep-disturbance symptoms (Sleep Disorders Symptom Check List; SDSCL). Family-context variables were assessed using the Familism Scale (HFS) and Mexican American Cultural Values Scale (MACVS).

Results: All enrolled dyads completed both pre- and post-intervention assessments, demonstrating successful implementation of the telehealth format. Participants showed significant reductions in insomnia severity, sleep-disturbance symptoms, and daytime sleepiness (all $p<.05$), along with a nonsignificant trend toward improved overall sleep quality. Specifically, ISI decreased from 7.45 (SD = 5.67) to 5.81 (SD = 4.05), $t(30)=2.32$, $p=0.028$, $d=0.42$; SDSCL decreased from 16.90 (SD = 16.14) to 11.23 (SD = 9.87), $t(30)=2.50$, $p=0.018$, $d=0.45$; and ESS decreased from 5.97 (SD = 3.62) to 4.80 (SD = 3.62), $t(29)=2.24$, $p=0.033$, $d=0.41$. Family-context variables remained stable over time, with a strong baseline correlation between familism and Mexican American cultural values ($r=0.526$, $p<.001$).

Conclusion: FAMILISMO is a culturally responsive, family-based telehealth intervention that can be implemented with Hispanic families. Preliminary analyses indicate that the program significantly reduced insomnia, sleep-disorder symptoms, and daytime sleepiness, with a positive trend toward better overall sleep quality. These findings support continued evaluation of dyadic, culturally grounded approaches to sleep health promotion in Hispanic populations.

Support (if any):

Abstract citation ID: zsag091.0893

0894

PRIOR EXPERIENCES OF ABUSE AND NEGLECT AS PREDICTORS OF CHANGE IN CHILDREN'S SLEEP AFTER ADOPTION FROM FOSTER CAREAshna Akepati¹, Carter Baker¹, Candice Alfano²¹University of Houston, ²Stony Brook University

Introduction: Sleep disruption is pervasive among children placed in foster care, elevating risk for a wide range of deleterious outcomes. Unfortunately, even after these children achieve permanency via adoption, sleep problems often persist (Cifre et al., 2024). The extent to which early experiences of abuse and/or neglect prior to placement in foster care may predict problems with sleep even after adoption is unknown. This study examined child experiences of physical abuse, sexual abuse, and neglect as separate predictors of changes in sleep among children adopted from foster care.

Methods: N=64 adoptive foster parents of a child, ages 6 to 10 years (M=7.9, SD=1.4) completed baseline surveys as a part of a child sleep intervention study. Children were roughly half female (56%) and relatively diverse (19% Black, 23% Hispanic). Parents reported whether their child's sleep 'remained the same', 'got worse' or 'improved' since the child was first placed in their care. Parents also provided report of adverse childhood experiences (ACEs) including whether the child experienced physical abuse, sexual abuse, or neglect.

Results: Multinomial logistic regression analyses were conducted. Child reported PROMIS Sleep Disturbance scores were included as a covariate. The experience of neglect significantly predicted worsened sleep after placement in the home, $b = 1.744$, $SE = .809$, $p = .031$. Physical abuse ($b = .482$, $SE = .773$, $p = .533$) and sexual abuse ($b = -.981$, $SE = .847$, $p = .247$) were not significant predictors of worsened sleep, however absence of physical abuse was a marginal predictor of improved sleep after placement in the home, $b = -1.226$, $SE = .716$, $p = .087$.

Conclusion: Early in life, sleep-wake regulation is facilitated by stable routines, predictable environments, and nurturing interactions with caregivers. Thus, childhood experiences of neglect, even more so than physical harm, may be particularly detrimental for sleep health across development. These findings underscore the enduring importance of parental involvement in sleep during early development and a need for targeted sleep interventions for children with a history of neglect.

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0895

SLEEP AND ADJUSTMENT IN FOSTER ENVIRONMENTS FOR SCHOOL-AGED CHILDREN (SAFE-C): FEASIBILITY AND ACCEPTANCE OF A TRAUMA-INFORMED SLEEP INTERVENTIONIvan Leonard¹, Carter Baker¹, Candice Alfano²¹University of Houston, ²Stony Brook University

Introduction: Sleep and Adjustment in Foster Environments for Toddlers and Preschoolers (SAFE-T), a brief, trauma-informed pediatric sleep intervention has shown efficacy for improving sleep among 2 to 5 year old children in foster care. Recently,

SAFE was modified for use with school-age children (SAFE-C) and evaluated in a randomized controlled trial among 6 to 10 year olds previously placed in foster care. Based on the presence of pervasive sleep problems in this population and because, unlike young children, school-aged children participated in treatment sessions, we were interested in examining treatment feasibility, along with parent and child treatment expectancy and satisfaction.

Methods: N=68 children (M=7.9, SD=1.4) adopted from foster care and their parent were randomized to SAFE-C (n=32) or waitlist control group (n=36). The intervention was delivered via telehealth over 4 session that included both the parent and child. At baseline, parents and children completed demographic and clinical questionnaires as well as the Credibility and Expectancy Questionnaire (CEQ) after receiving their treatment assignment. At post-treatment, the SAFE-C group completed the Client Satisfaction Questionnaire (CSQ).

Results: A total of 29/32 families (91%) assigned to SAFE-C completed all treatment sessions. Average time to complete 4 weekly sessions was less than one month (M=26.1 days) and most children actively participated in all treatment sessions. Both parents and children assigned to SAFE-C reported high rates of treatment expectancy. Higher treatment expectancy was associated with older child age ($r=.27$, $p=.031$) and lower parenting stress ($r=-.31$, $p=.012$) but not severity of child sleep problems. Both parents and children were highly satisfied with the treatment based on CSQ scores as well as qualitative feedback at post-treatment.

Conclusion: Findings suggest SAFE-C is a feasible and acceptable intervention for school-aged children with a history of adversity and/or trauma associated with foster care placement. Because severity of child sleep problems or sleep-related impairment was not associated with either parent or child treatment expectancy, future research should seek to better understand the factors/variables that shape treatment expectations.

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0896

CANNABIS AND ALCOHOL USE PREDICTS INSOMNIA SYMPTOMS AND SLEEP LOCUS OF CONTROL IN COLLEGE STUDENTSSydney Johnson¹, Jennifer Prichard², Mari Gades²¹University of St. Thomas, MN, ²University of St. Thomas

Introduction: For college students, getting sufficient, good quality sleep is important to mental health and academic success, yet few college students get the recommended 8 hours of sleep. Research shows students frequently self-medicate for sleep with alcohol, cannabis, or over-the-counter sleep aids. Previous research has reported substance use and sleep problems among college students separately, but little is known about whether self-medicating for sleep aligns with perceived control. This study examined whether: 1) substance use relates to insomnia symptom severity, daytime sleepiness, and sleep locus of control, and 2) students using substances for sleep report worse sleep outcomes.

Methods: Undergraduate students from the United States (N=185, ages 18-35, M=21.32) were recruited through convenience sampling and Prolific to complete an online, cross-sectional survey. Participants completed the Insomnia Severity Index (ISI), Sleep Locus of Control scale (SLOC), the Epworth Sleepiness Scale (ESS), a modified Drug Use Motives questionnaire, and questions

pertaining to substance use. One-way ANOVAs compared sleep outcomes across non-users, sleep-motivated users, and non-sleep-motivated users. Tukey HSD post-hoc tested for significant effects.

Results: Sleep-motivated cannabis users ($n=32$) had higher ISI scores ($M=12.2$) than non-sleep motivated users ($n=19$, $M=5.37$, $p<.001$) and non-users ($n=134$, $M=8.34$, $p=.001$), and lower SLOC scores ($M=27.7$) than non-users ($M=31.4$, $p=.006$). Sleep-motivated alcohol users ($n=18$) showed higher ISI scores ($M=13.2$) than non-sleep motivated users ($n=102$, $M=7.40$, $p<.001$) and non-users ($n=65$, $M=9.52$, $p=.038$), and lower SLOC scores ($M=27.1$) than non-users ($M=31.6$, $p=.018$). In contrast to ISI and SLOC, daytime sleepiness (ESS) did not differ significantly across cannabis or alcohol user groups.

Conclusion: Students who use cannabis and alcohol specifically for sleep reported significantly worse insomnia symptoms and lower perceived control over sleep as compared to both non-users and users who reported other motivations (ex: enhancement or coping) for use. Since college is a vulnerable period for the onset of mental disorders, substance use disorders, and sleep problems, patterns established during this critical period could have a lasting impact throughout adulthood. Longitudinal studies are needed to investigate how these relationships unfold over time.

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0897

ACCEPTABILITY AND FEASIBILITY OF IMPLEMENTING A BEDTIME ROUTINE FOR NEWBORNS

Jodi Mindell¹, Erin Leichman¹, Mary Mack²

¹Saint Joseph's University, ²Kenvue Brands LLC

Introduction: Bedtime routines are associated with better sleep outcomes in newborns, as well as improved sleep and other outcomes in infants. However, no studies have investigated bedtime routines instituted as early as the first few weeks of life. Thus, the aim of this study was to assess caregiver acceptability and feasibility of implementation of a recommended bedtime routine for newborns.

Methods: 127 mothers of newborns (2-6 wks; $M=4.5$ wks) were randomly assigned to a bedtime routine intervention, which included a recommended 3-step bedtime routine (i.e., washing up/bath, application of lotion, and quiet activities; $n=67$) versus control ($n=60$). Measures of acceptability and feasibility were collected at 1-week, 2-weeks, and follow-up at 3-months, and 6-months.

Results: Mothers in the intervention group were more likely to report having a bedtime routine at 1-week, 2-week, 3-month, and 6-month follow-up (80% vs 43%, 80% vs 53%, 97% vs 80%, 93% vs 83%, respectively). For those in the intervention group, a majority of the mothers indicated that they were doing the recommended 3-step routine (69%, 74%, 73%, and 77%). They also indicated ("strongly agree" and "agree") that they liked it (83%, 92%, 92%,

93%), it helped them bond with their baby (89%, 94%, 93%, 97%), and they would continue to do a bedtime routine in the future (91%, 92%, 93%, 88%).

Conclusion: Overall, a recommended bedtime routine that included washing up/bath, massage, and quiet activities was feasible, acceptable, and considered supportive of bonding for mothers of newborns, with the majority continuing to implement the recommended routine at 6-month follow-up. A bedtime routine is a simple recommendation that can be made by healthcare providers from as early as 2 weeks of age.

Support (if any): Kenvue Brands LLC, Summit, NJ, USA

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0898

CHRONIC SLEEP RESTRICTION AND WEEKEND RECOVERY SLEEP AS INDEPENDENT CONTRIBUTORS TO ADOLESCENT SLEEP AND MOOD SYMPTOMS

Elijah Nichols, Anna Quesada, Nancy Hamilton
University of Kansas

Introduction: Adolescence is a high-risk period for insufficient sleep, yet the extent to which chronic sleep restriction contributes to sleep disturbance and mood problems, independent of psychological symptoms or compensatory weekend sleep, remains unclear. This study examined whether chronic sleep restriction, weekend sleep duration, and mood symptoms were associated with sleep quality, and whether weekend "catch-up" sleep or anxiety/depression moderated these relationships.

Methods: Participants were adolescents ($N=110$; 49% female; $Age=16.71$). Measures included the Chronic Sleep Restriction Questionnaire (CSRQ), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Horne-Östberg Morningness-Eveningness Questionnaire, Beck Anxiety Inventory (BAI), and Beck Depression Inventory-Youth (BDI-Y). Correlations, linear regression models, and moderation models were used in SPSS v. 29.

Results: Shorter weekday sleep ($r=-0.53$, $p<0.001$), shorter weekly average sleep ($r=-0.56$, $p<0.001$), and greater chronic sleep restriction ($r=0.47$, $p<0.001$) were associated with poorer sleep quality. In adjusted models, CSRQ remained the strongest predictor of PSQI ($\beta=0.54$, 95% CI [0.32, 0.76], $p<0.001$), accounting for 26.5% of variance. CSRQ also predicted higher anxiety ($\beta=0.35$, 95% CI [0.18, 0.52], $p<0.001$) and depressive symptoms ($\beta=0.28$, 95% CI [0.02, 0.54], $p=.038$). Weekend sleep showed an independent trend association with anxiety ($\beta=-0.19$, $p=.055$), but none of the CSRQ x Weekend Sleep or CSRQ x Mood interactions were significant ($\beta s=0.01-0.06$, $p s>0.50$), and model fit did not meaningfully improve.

Conclusion: Chronic sleep restriction was robustly associated with poorer sleep quality and higher anxiety and depression in adolescents. Weekend "catch-up" sleep and mood symptoms contributed independently but did not modify the impact of chronic insufficient sleep. Findings highlight chronic sleep restriction as a central target for intervention during adolescence.

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0899

EARLY CHILDHOOD SLEEP RESOURCES VARY BY CAREGIVER SHIFT WORK: PERCEPTIONS OF ENHANCED USUAL CARE FAMILIES IN AN RCT

Megha Neelapu¹, Brizhay Davis², Katherine Wu², Diandra Leon³, Olivia Elliott², Chimereodo Okoroji⁴, Kristina Boling-Smith², Bethany Harvey², Rachel Honore², L'Vonne McMillan², Alexander Fiks², Thomas Power², Jodi Mindell⁵, Ariel Williamson⁶

¹University of Chicago, ²Children's Hospital of Philadelphia, ³University of Oregon, ⁴Cincinnati Children's Hospital Medical Center, ⁵Saint Joseph's University, ⁶The Ballmer Institute for Children's Behavioral Health, University of Oregon

Introduction: Little is known about sleep problem resolution and resources sought among families receiving usual care in outpatient pediatrics. This mixed methods study examined caregiver-perceived child sleep problems and experiences seeking sleep care in families randomized to "enhanced usual care" (EUC; provision of a sleep education handout) in a randomized controlled trial (RCT) of a behavioral sleep intervention. We also examined whether perceptions varied by caregiver shift work, which can impact child sleep.

Methods: Of the 97 caregiver-child dyads in the RCT, 47 were randomized to EUC (caregivers: 98% mothers, 75% Black, 36% shift-working, 36% living $\leq 125\%$ of poverty line; mean child age=2.6 years, 53% girls). Of the 47 randomized to EUC, 36 completed the follow-up (~15 weeks post-baseline), which included caregiver-reported child sleep problems (5-point Brief Child Sleep Questionnaire item dichotomized as no/a very small problem vs a small to severe problem) and a semi-structured interview regarding perceptions about the EUC sleep education handout and any other sleep resources sought. Integrated thematic analysis was used for qualitative coding ($\kappa=0.84$), with a joint display analysis used to stratify and compare themes for shift-working and non-shift working caregivers.

Results: Shift workers were more likely to report a child sleep problem at follow-up (89%) than non-shift workers (44%), $X^2=4.90$, $p=.027$. Qualitatively, some non-shift-working caregivers noted that the EUC sleep education handout was beneficial for addressing child sleep. In contrast, shift workers described the handout as being unhelpful, stating that they had already tried the strategies listed. Shift workers also reported making extra pediatrician or specialist appointments or seeking other interventions to address sleep, noting limited guidance overall. Non-shift-working caregivers did not reference these resources and described doing their own online research for support.

Conclusion: Shift workers were less likely than non-shift workers to report early childhood sleep problem resolution at 15 weeks after assignment to enhanced usual care in an RCT. Shift workers also described the sleep education handout provided as unhelpful, and, unlike non-shift-working caregivers, described being unable to find helpful external sleep resources. Future research

on tailoring early childhood sleep resources for shift-working families is needed.

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0900

FAULTY FOCUS, SLEEP SUFFERS: GRANDPARENT CAREGIVING RESPONSIBILITY AND GRANDCHILD SLEEP

Samantha Greenfield, Chandana Hemakumar, Jalal Jamil, Melanie Stearns, Christina McCrae
University of South Florida

Introduction: Grandparents raising grandchildren face heightened caregiving demands that may strain cognitive functioning and family routines. Cognitive failures, such as lapses in attention, memory, or action, can undermine caregiving quality and are associated with greater difficulty maintaining consistent bedtime routines. This may lead to disrupted grandchild sleep and poor sleep habits, ultimately contributing to longer sleep onset latency (SOL). Despite the growing number of grandparent caregivers in the United States, little research has examined how caregiver cognitive functioning interacts with caregiving responsibility to affect grandchildren's sleep. This study sought to fill that gap.

Methods: Grandparents ($N=185$, $Mage=54.31$, 79.8%-female) who reported living with and being responsible for the care of their grandchildren ($Mage=8.05$, 49.4%-female) completed the Cognitive Failures Questionnaire. They also reported how many hours they are responsible for their grandchild (ranging from 0 hours to more than 40 hours a week) and the average number of minutes it takes their grandchild to fall asleep in the past week (SOL). SPSS PROCESS conducted moderation analyses, controlling for grandchild and grandparent age and sex.

Results: Cognitive failures interacted with caregiving responsibility ($F(1, 156) = 2.21$, $p = .01$) in its association with SOL ($R^2 = .15$, $p = .001$). Specifically, increased cognitive failures was associated with increased grandchild SOL among grandparents who reported being more responsible for their grandchildren ($t(1, 156) = 1.99$, $p = .04$). There was also a main effect of grandparent cognitive failures predicting grandchild SOL ($F(1, 156) = 1.75$, $p = .04$).

Conclusion: These findings suggest that grandchildren may be more affected by caregiver cognitive strain when grandparents play a more central role in daily care. Such effects may arise because caregiver cognitive failures are associated with inconsistent bedtime routines, leading to disrupted child sleep and the development of maladaptive sleep habits. Future research should examine parenting behaviors as potential mediators and employ longitudinal designs to clarify causal pathways over time. In addition, future research should examine whether family-based interventions that reduce caregiver cognitive failures may promote greater consistency in bedtime routines, thereby improving child SOL and reducing the risk of long-term sleep disturbances.

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0901

IS THE FEAR OF SLEEP (FOS) CONSTRUCT RELEVANT FOR TRAUMA-EXPOSED CHILDREN? AN EXPLORATORY STUDY AMONG CHILDREN PLACED IN FOSTER CARE

Abigail Mack¹, Yi Yang¹, Carter Baker², Candice Alfano¹

¹Stony Brook University, ²University of Houston

Introduction: Sleep disturbances are pervasive and impairing among children placed in foster care, commonly underpinned by nighttime fears and anxiety. Fear of Sleep (FoS), which refers to nocturnal fears associated with trauma-related sleep disturbance, has been shown to predict more severe and prolonged sleep disturbance in trauma-exposed adults and represents an important target for intervention. The FoS construct may also be relevant for children exposed to trauma but has not been examined in child samples. In this study we explored the reliability and validity of the FoS construct in a sample of school-aged children with a history of foster care placement.

Methods: N=68 children adopted from foster care and their parent completed baseline surveys as part of a child sleep intervention study. Children, ages 6 to 10 years, (Mage=7.9, SD=1.4) were roughly half female (56%) and relatively diverse (19% Black, 23% Hispanic). Children completed a modified, age-appropriate version of the Fear of Sleep Inventory (FoSI), the PROMIS Sleep Disturbances scale (PROMIS SD), and the Pre-Sleep Arousal Scale for Children (PSAS-C), and parents completed the Children's Sleep Habits Questionnaire (CSHQ).

Results: The 23-item FoSI demonstrated good internal consistency (Cronbach's $\alpha = .84$). Convergent validity was also found based on moderate to strong associations with related measures including both cognitive and somatic pre-sleep arousal (PSAS-C: $r = .62$ and $r = .59$, respectively) and overall sleep disturbance severity (PROMIS SD: $r = .43$). The FoSI also demonstrated small to moderate associations with parent-reported CSHQ bedtime resistance ($r = .32$) and sleep anxiety ($r = .32$).

Conclusion: In our small sample of trauma-exposed children, the modified FoSI demonstrated internal consistency and convergent validity, suggesting promise as a measure of nocturnal fears that could inform intervention delivery. Future studies are needed to examine the utility of the FoSI in other trauma-exposed child samples.

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0902

PARENTAL DECISION-MAKING AROUND PEDIATRIC MELATONIN USE: INITIATION AND DISCONTINUATION PATTERNS IN TYPICALLY DEVELOPING CHILDREN

Melanie Stearns¹, Kevin Chen¹, Micah Mazurek², Jessica Page³, Jennifer Takagishi⁴, Patricia Emmanuel⁴, Xiaoli Zhang¹, Judith Owens³, Christina McCrae¹

¹University of South Florida, ²University of Virginia, ³Boston Children Hospital, ⁴Morsani College of Medicine

Introduction: Melatonin, a widely available over-the-counter supplement, is frequently used by caregivers to manage pediatric sleep difficulties despite limited guidance on its long-term safety and effectiveness. Understanding caregiver experiences with melatonin, including reasons for use, perceived effectiveness, and barriers to use, is critical for informing clinical practice and guiding families toward evidence-based behavioral sleep interventions. This study addresses this gap.

Methods: Caregivers (N=389, Mage=37.85, 51.9%-female) of school-aged children (ages 8-12, Mage=9.40, 45.5%-female) with insomnia (defined as >30 minutes of sleep onset latency or wake after sleep onset on >3 nights in the past week) reported on their past experiences using melatonin to improve their child's sleep. Analyses in SPSS examined the proportion of parents who reported prior use of melatonin and why or why not they had given their children melatonin.

Results: Almost half of caregivers (48%) indicated melatonin was ineffective for their child's sleep, while 36% found it helpful, and 15% had never used it. Among those who had tried melatonin for their child, the most common reasons were provider recommendation (57%), ease of use (56%), perceived effectiveness (53%), and availability (46%), with fewer citing affordability (21%). Caregivers who discontinued melatonin for their child noted concerns about reliance (41%), lack of effectiveness (37%), side effects (36%), cost (24%), or resolution of sleep problems (22%). Caregivers who never used melatonin cited reluctance to medicate (40%), concerns about side effects (38%), safety concerns (25%), lack of provider recommendation (15%), perceived ineffectiveness (13%), or cost (5%).

Conclusion: Findings highlight the widespread use of melatonin among caregivers, with mixed perceptions of its effectiveness and notable concerns about reliance, side effects, and safety. Given the high rate of perceived ineffectiveness, discontinuation, and hesitancy to use melatonin, families may benefit by having clinicians emphasize behavioral sleep strategies as first-line interventions. Future research should examine long-term outcomes of pediatric melatonin use, clarify appropriate indications, and compare supplement use with evidence-based behavioral sleep interventions.

Support (if any):

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0903

REAL-TIME LINKS BETWEEN ONLINE DISCRIMINATION AND SLEEP DISTURBANCES AMONG MINORITIZED YOUTH

Aijia Yao, Marcus Shipp, Jessica Hamilton

Rutgers University, New Brunswick

Introduction: Social media is a primary setting for adolescents' daily social lives, particularly for racial, sexual, and gender minority teens who turn to online platforms for support. Yet online spaces can expose youth to online discrimination, a chronic, stressful, and threat-related experience that may disrupt sleep. Online discrimination can be direct (targeting the individual) or vicarious (witnessing others targeted), but prior research has focused largely on offline or direct experiences. Moreover, although emerging work connects discrimination to sleep disturbance, studies rely primarily on retrospective subjective reports, with little use of intensive monitoring to characterize nightly consequences. Given that sleep is fundamental to adolescent brain

development and daily functioning, this study aims to investigate whether weekly direct and vicarious online discrimination impact subjective (sleep quality, nightmares) and objective sleep (total sleep time [TST], wake after sleep onset [WASO]) among racial, sexual, and gender minority adolescents. It is hypothesized that both forms of discrimination are linked to worse sleep quality, a higher likelihood of nightmares, less TST, and increased WASO in the same-week and one-week after.

Methods: Youth with minoritized identities enrolled into an eight-week intensive monitoring study, completed daily diaries, and wore actigraphy watches. Multilevel models tested same-week and one-week prospective effects, adjusting for age, SES, depressive symptoms, and average daily social media use duration.

Results: In a sample of adolescents with racial/ethnic or sexual and gender minority identities who contributed ≥ 2 weeks of EMA and actigraphy ($N=58$; mean age=15.2; 252 weeks of observations), we found that neither discrimination type was linked to same-week sleep quality, TST, or WASO ($p>.05$). However, prospective analysis showed that direct discrimination was linked to an increased likelihood of nightmare ($OR=10.56$, 95% $CI=2.34-47.66$, $p=.002$) and increased WASO ($\beta=20.79$ min, $SE=10.22$, $p=.047$), whereas vicarious discrimination showed no significant concurrent or prospective effect ($p>.10$).

Conclusion: Despite low base rates, direct discrimination online showed strong, delayed effects on nightmares and WASO prospectively. Findings highlight the threat-specific sleep nocturnal hyperarousal and REM-related emotional dysregulation among minoritized youth. Future work should examine dose-response patterns, event severity, and physiological mediators (e.g., HRV), and evaluate whether supportive online interactions buffer these effects.

Support (if any):

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0904

SLEEP DISTURBANCES AND ANXIETY/DEPRESSIVE SYMPTOMS IN CHILDREN PLACED IN FOSTER CARE: THE MODERATING EFFECT OF CAREGIVER CONNECTION

Carter Baker¹, Candice Alfano²

¹University of Houston, ²Stony Brook University

Introduction: Children who spend time in foster care experience high rates of sleep disturbances, often exacerbated by symptoms of anxiety or depression (Alfano, 2020). Other research has found positive interactions with caregivers prior to sleep to be protective of these problems (Cifre et al., 2024). The present study examined whether affectionate interactions with caregivers prior to sleep moderates the association between child anxiety/depressive symptoms and sleep disturbances among children adopted from foster care.

Methods: $N=66$ adoptive foster parents completed baseline surveys as part of a child sleep intervention study. Adopted children ($Mage=7.9$, $SD=1.4$) were roughly half female (56%) and relatively diverse (19% Black, 23% Hispanic). Parents completed the Children's Sleep Habits Questionnaire (CSHQ), the Revised Child Anxiety and Depression Scale (RCADS-25), and the Bedtime Routines Questionnaire (BRQ). Two BRQ items capturing affectionate interactions (26. In the past month, in the hour before going to bed, how often did your child hug/kiss caregiver?; 31. In the past

month, in the hour before going to bed, how often did your child cuddle with caregiver?) were examined as moderators.

Results: A linear regression model found higher RCADS scores were a strong predictor of greater sleep problems ($b = 0.53$, $SE = 0.09$, $p < .001$). The RCADS $\times$ Affectionate Interaction items approached significance ($b = -0.08$, $SE = 0.04$, $p = .072$) based on a small-to-moderate effect, whereby more frequent affectionate interactions reduced the strength of the association between anxiety and sleep problems. For specific types of sleep problems, affectionate interactions marginally moderate the relationship between RCADS and bedtime resistance ($b = -0.03$, $SE = 0.01$, $p = .064$) and significantly moderate the association with sleep onset delay ($b = -0.01$, $SE = 0.004$, $p = .046$).

Conclusion: Findings corroborate results from prior studies showing warm, intimate parent-child interactions before sleep have a positive impact on children's sleep health, particularly bedtime resistance and sleep onset delay. Interventions that promote greater emotional connection as part of child bedtime routines may be particularly critical for children who have experienced maltreatment and/or interpersonal trauma.

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0905

SLEEP HEALTH & DEPRESSION SEVERITY IN TEENS: WHICH SLEEP VARIABLES ARE MOST RELEVANT? – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

El Sterling¹, Suzanne Gorovoy², Joseph Dzierzewski³, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Arizona College of Medicine, ³National Sleep Foundation

Introduction: Understanding which specific aspects of sleep are most strongly related to depression symptoms in adolescents can inform public health prevention and intervention efforts.

Methods: Data were collected as part of the National Sleep Foundation Sleep in America® Poll. The random, population-based sample included $N=1,097$ teens who provided complete data. Depression symptoms were assessed with the PHQ8 scale, evaluated categorically (Minimal, Mild, Moderate-Severe). Sleep variables included weekday and weekend total sleep time, bedtime, and wake time, days/week feeling rested, with difficulty falling asleep, staying asleep, sleepiness, taking sleep-promoting medications, and sleep impacting daytime function (coded 0-7), diagnosed sleep disorder, talked to doctor about sleep, and perceived sleep need. Regression analyses adjusted for age, gender, race/ethnicity, and socioeconomic. Bonferroni correction (0.05/18) was used.

Results: Across the sample, 61.6% of teens reported minimal depressive symptoms, 23.5% mild, and 14.8% moderate-severe depressive symptoms. Elevated likelihood of mild depression was found for fewer days/week feeling rested and more days/week difficulty falling asleep, difficulty staying asleep, sleep impacting daytime function, and sleepiness. Elevated likelihood of mild depression was also associated with greater perceived sleep need and sleep deficit. Elevated likelihood of moderate-severe depression was found for shorter weekday sleep duration, later bedtime, fewer days/week feeling rested, and more days/week difficulty falling asleep, difficulty staying asleep, sleep impacting daytime function, sleepiness, and taking sleep-promoting medications; it

was also associated with sleep disorder diagnosis, and greater sleep deficit.

Conclusion: These findings reinforce that both nighttime sleep characteristics and daytime consequences of poor sleep are central to adolescent mood health. Public health initiatives, including broad awareness campaigns and integrating brief screening for sleep difficulties or potential sleep disorders into school health assessments—and improving referral pathways to behavioral or medical sleep interventions—could provide a pragmatic route to improving both sleep and mental health outcomes at scale. Efforts to improve teen mental health may benefit from addressing not only sleep duration but also sleep quality, consistency, and perceived restfulness.

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0906

SLEEP HEALTH AND DEPRESSION IN TEENS: WHICH SLEEP VARIABLES ARE THE MOST RELEVANT? – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

El Sterling¹, Suzanne Gorovoy², Joseph Dzierzewski³, Girardin Jean-Louis⁴, Alicia Chung⁵, Azizi Seixas⁴, Carolina Scaramutti⁴, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Arizona College of Medicine, ³National Sleep Foundation, ⁴University of Miami, ⁵NYU School of Medicine

Introduction: One in 5 adolescent Americans have experienced at least one major depressive episode. This study aimed to explore which aspects of sleep health and sleep satisfaction contribute most to depressive symptoms in teens.

Methods: Data were collected from the National Sleep Foundation Sleep in America® Poll. The random, population-based sample included N=1,097 teens (age 13-17) who provided complete data. Depression symptoms were assessed with the PHQ8 scale, evaluated as a continuous variable with the sleep item removed (sum of 7 items). Sleep variables included sleep quality (excellent, very good, good, fair, poor), weekday and weekend total sleep time, bedtime, and wake time, days/week feeling rested, with difficulty falling asleep, staying asleep, sleepiness, taking sleep-promoting medications, and sleep impacting daytime function (coded 0-7), diagnosed sleep disorder, talked to doctor about sleep, and perceived sleep need. Regression analyses adjusted for age, gender, race/ethnicity, and socioeconomic status. Bonferroni correction (0.05/18) was used.

Results: The range of depressive symptoms scores was 0-21, reflecting the full possible range; however, scores were generally low, with mean 3.7 (SD=4.2) and IQR 0-6. Higher depression scores were associated with fair (+3.28 pts) and poor (+3.84 pts) sleep quality, weekday sleep duration (-0.45 pts/hr), feeling rested (-0.69 pts/day), difficulty falling asleep (+0.63 pts/day), difficulty staying asleep (+0.54 pts/day), sleep impacting daytime function (+0.71 pts/day), sleepiness (+0.37 pts/day), taking sleep-promoting medications (+0.38 pts/day), diagnosed sleep disorder (3.54 pts), and sleep need (+0.34 pts/hr). A forward stepwise model indicated that the variables that contributed the most unique variance were (in order): days difficulty falling asleep, days feeling rested, days sleep impacts functioning, diagnosed sleep disorder, sleep quality, and weekend waketime (all $p < 0.05$). These results suggest that adolescent depression risk is driven more strongly by subjective

sleep experience and daytime impairment than by sleep duration alone.

Conclusion: Higher depression scores were associated with worse sleep quality. In particular, subjective sleep satisfaction and next-day experiences were especially important. Further studies should aim to assess the effectiveness of public health interventions targeting these specific outcomes.

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0907

SLEEP HEALTH AND SOCIAL ISOLATION AMONG TEENS – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

Arya Eksambe¹, Suzanne Gorovoy², Joseph Dzierzewski³, Girardin Jean-Louis⁴, Alicia Chung⁵, Azizi Seixas⁴, Patricia Haynes¹, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Arizona College of Medicine, ³National Sleep Foundation, ⁴University of Miami, ⁵NYU School of Medicine

Introduction: Social relationships significantly affect sleep quality and that negative social experiences are harmful to sleep and mental health. Adolescence is marked by significant cognitive, emotional, identity, and social development, and during this time, teenagers are at considerable risk of experiencing poor sleep quality. The goal of this report is to examine the association of social isolation to sleep health in adolescents.

Methods: Data were collected as part of the National Sleep Foundation Sleep in America® Poll. The random, population-based sample included N=1,097 teens (age 13-17) who provided complete data. Social isolation was assessed as “In the past seven days, how often, if at all, did you feel lonely or isolated?” Responses were never, once or twice, a few times, nearly every day, or every day, and were coded on an ordinal scale. Sleep variables included sleep quality (excellent, very good, good, fair, poor), weekday and weekend total sleep time, bedtime, and wake time, days/week feeling rested, with difficulty falling asleep, staying asleep, sleepiness, taking sleep-promoting medications, and sleep impacting daytime function (coded 0-7), diagnosed sleep disorder, talked to doctor about sleep, perceived sleep need. Regression analyses adjusted for age, gender, race/ethnicity, and socioeconomic status. Bonferroni correction (0.05/18) was used.

Results: Loneliness rates were 47.5% (never), 27.0% (once or twice), 16.4% (a few times), 6.4% (nearly every day), and 2.6% (every day). Elevated social isolation was associated with fewer days/week feeling rested (oOR=0.81/day) and more days/week with difficulty falling asleep (oOR=1.25/day), difficulty staying asleep (oOR=1.18/day), sleep impacts functioning (oOR=1.26/day), and taking sleep-promoting medications (oOR=1.18/day). Elevated social isolation was also associated with sleep disorder diagnosis (oOR=5.50).

Conclusion: Elevated social isolation is negatively associated with sleep health among adolescents. Increased social isolation is associated with lower sleep duration and restfulness, as well as increased use of sleep-promoting medications and sleep disorder diagnoses. Targeted initiatives that promote human connection may address the cause of social isolation and perhaps could help improve sleep and mental health among adolescents, thereby improving public health and well-being.

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0908

SLEEP AND EATING DISORDER BEHAVIORS IN CHILDREN AND ADOLESCENTS: AN INTERSECTIONAL ANALYSIS

Sreoshi Chowdhury, Emily Feldman, Prynce Fant
University of North Texas

Introduction: Poor sleep health, eating disorder behaviors, and body image concerns affect millions of children and adolescents across the US. However, research examining how these issues intersect remains limited, particularly for children from marginalized communities. This study examined associations between sleep problems and eating disorder behaviors with a focus on how these relationships vary across intersecting race-sex identities.

Methods: Using the 2022-2023 National Survey of Children's Health, we analyzed caregiver-reported responses from a nationally representative sample (mean age = 11.6 years; 48.8% females). Weighted logistic regression models assessed relationships between sleep health (sufficient sleep duration and consistent bedtime) and eating disorder behaviors across race and sex groups.

Results: Over one-third (35.5%) of children experienced insufficient sleep, with Black males (52.5%) and females (48.3%) showing the highest rates compared to the national average. Poor sleep health was more strongly associated with eating disorder behaviors than the reverse. Inconsistent sleep showed the strongest associations: more than double the odds of fasting (OR = 2.10) and binge eating (OR = 2.22), and 56% increased odds of body image concerns (OR = 1.56). Hispanic/Latine and Multiracial females demonstrated elevated risk across multiple eating disorder behaviors relative to White males.

Conclusion: Findings underscore the importance of intersectional approaches to understanding pediatric sleep and eating disorder behaviors. Results suggest sleep health may be an important intervention target, though longitudinal research is needed to establish temporal relationships and inform prevention efforts.

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0909

DAYTIME SLEEPINESS, GENDER, AND DEPRESSIVE SYMPTOMS – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

Athena Ruiz¹, Benjamin Grandner², Lauren Hartstein³, Suzanne Gorovoy⁴, Joseph Dzierzewski⁵, Girardin Jean-Louis⁶, Alicia Chung⁷, William Killgore⁸, Michael Grandner⁸

¹Sahuarita High School, ²Catalina Foothills High School, ³University of Arizona College of Medicine Tucson, ⁴University of Arizona College of Medicine, ⁵National Sleep Foundation, ⁶University of Miami, ⁷NYU School of Medicine, ⁸University of Arizona

Introduction: Daytime sleepiness and mental health problems are both very common among US adolescents. But little is known about how they are associated at the population level and how this relationship may differ in boys and girls.

Methods: Data were obtained from the National Sleep Foundation Sleep in America® Poll. The random, population-based sample (N=1,136) provided data on a range of sleep questions, as well as

items from the PHQ8 depression scale. For the present analyses, daytime sleepiness was assessed with the item, "How many days did you fall asleep without intending to, such as dozing off in front of the TV or in any other situation?" Responses ranged from 0-7. PHQ8 items included frequency of depressed mood, anhedonia, sleep disturbance, appetite disruptions, low energy, excessive guilt, difficulty concentrating, and psychomotor disturbances during the past 2 weeks. Responses were categorized as "None," "Less than half the days," or "More than half the days." Population-weighted multinomial logistic regression analyses, with depressive symptoms as outcome and days/week of sleepiness as the exposure were adjusted for age, sex, race/ethnicity, rurality, and weekday sleep duration. Post-hoc analyses examined gender interactions.

Results: Prevalence of daytime sleepiness was 42.3% (0 days), 15.6% (1 day), 14.9% (2 days), 10.9% (3 days), 6.7% (4 days), 4.7% (5 days), 1.4% (6 days), and 3.5% (7 days). Each additional day/week of sleepiness was associated with an increased likelihood of depressed mood (14.5% some days and 19.7% most days), anhedonia (19.4% some days and 17.4% most days), sleep disturbance (20.4% some days and 31.9% most days), appetite dysregulation (18.3% most days), low energy (13.4% some days and 39.6% most days), difficulty concentrating (19.5% most days), and psychomotor disturbances (14.9% some days). Significant gender interactions existed for all variables, and relationships were significantly stronger for girls compared to boys.

Conclusion: Daytime sleepiness is common in US teenagers and may represent a risk factor for depressive symptoms. It is unclear why this relationship is stronger in girls versus boys. Future work is needed to better understand these associations and develop better strategies for identifying and reducing sleepiness in adolescent health.

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0910

"I WOULD CHANGE ANYTHING THAT I COULD POSSIBLY CHANGE JUST TO GET SOME SLEEP": THE LIVED EXPERIENCES OF AUTISM CAREGIVERS

Yasmin Andalib¹, Althea Kastelic¹, Erin Riddell¹, Kahsi Pedersen², Briana Taylor¹

¹Northeastern University, ²MaineHealth Institute for Research

Introduction: Sleep problems affect up to 80% of autistic youth, and many caregivers struggle to manage them despite trying numerous evidence-based approaches. Despite the critical role that caregivers play in the management of child sleep problems, the caregiver experience, including psychological strain they may face, remains largely overlooked in autism sleep research. Understanding the subjective experiences of caregivers may clarify barriers to intervention implementation and adherence, and facilitate the development of more tailored, feasible sleep management tools. This study uses a mixed-methods approach to understand patterns in caregivers' lived experiences managing sleep problems in autistic children.

Methods: We conducted semi-structured interviews with caregivers of autistic youth, exploring their thoughts regarding their child's sleep and broader autism research (N = 25). A Large Language Model was used to identify unsolicited recurring themes, and quantitative child, parent, and household characteristics

were compared between caregivers who did and did not express these themes. Given the small sample size, we only report effect sizes (η^2) to indicate the magnitude of the group differences.

Results: Across all themes, hypervigilance due to nighttime safety concerns and powerlessness were among the most salient. Caregivers expressing hypervigilance showed lower perceived control over their child's sleep ($\eta^2 = 0.27$), higher problematic parent-child sleep interactions ($\eta^2 = 0.18$), and poorer sleep quality ($\eta^2 = 0.21$). Caregivers expressing powerlessness had children with greater sleep disturbance severity ($\eta^2 = 0.37$).

Conclusion: This study revealed that caregivers' emotional experiences, such as hypervigilance and powerlessness cluster with clinically meaningful child and caregiver characteristics and may shape sleep management. Nighttime safety concerns may make bedtime a particularly contentious time and disrupt caregiver sleep due to active or anticipated emergencies. Meanwhile, the tie between powerlessness and greater child sleep disturbance severity may indicate that existing interventions are not effective for a subset of families and novel interventions are needed for high-severity cases. Future directions include investigating how dimensions of psychological strain affect intervention adherence, and how caregiver-centered strategies can be designed to better align with families' needs and constraints.

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0911

CHARACTERIZATION OF SLEEP ARCHITECTURE AND OTHER SLEEP BIOMARKERS IN ADOLESCENTS WITH FUNCTIONAL ABDOMINAL PAIN

Neha Santucci¹, Priyanshi Shah¹, Thomas Dye², Khalil El-Chammas¹, Kahleb Graham¹, Robert Coghill¹, Christopher King¹

¹Cincinnati Children's Hospital Medical Center, ²Cincinnati Children's Hospital

Introduction: Functional Abdominal Pain Disorders (FAPD) are associated with significant functional disability and sleep disturbances. To date, no studies have characterized differences in sleep architecture and sleep spindles, the representation of the thalamic gating function of sensory information to the cortex during Non-Rapid Eye Movement (NREM) sleep, in pediatric FAPD. We aimed to examine sleep architecture and sleep spindles in adolescents with FAPD compared to healthy controls.

Methods: Adolescents (age 11-18 years) with FAPD and age/gender-matched controls underwent polysomnography (PSG) according to AASM guidelines. The first four hours of artifact-free NREM sleep were analyzed using fast Fourier transformation with Welch tapered windows of 1024 samples (and 50% overlap) averaged over 30-second epochs. Total power was calculated for very low (0.3 – 1 Hz), delta (1 – 4 Hz), theta (4 – 8 Hz), and alpha (8-12 Hz) frequencies. Sleep spindles were characterized using the YASA python package / A7 algorithm with selections confirmed against gold standard (manual scoring).

Results: Of 41 subjects (FAPD=21, control=20), the FAPD group had greater arousal index and lower %NREM3 sleep when compared to controls (FAPD arousals: mean=10.08/min $\pm$ 4.89 min, control arousals mean=7.31/min $\pm$ 3.61/min, $p = 0.046$, FAPD NREM3: mean=20.13% $\pm$ 5.47%, control NREM3: mean=24.77% $\pm$ 6.94%, $p = 0.02$). Delta power was significantly lower in the

FAPD group compared to controls (FAPD Delta mean=488.67 μ V2 $\pm$ 282.82 μ V2, control Delta mean=1193.14 μ V2 $\pm$ 663.89 μ V2, $p < 0.001$). During NREM2 sleep, the FAPD group had significantly greater spindle density over frontal head regions than controls (FAPD: 2.80/min $\pm$ 1.39/min, control: 1.86/min $\pm$ 1.35/min, $p = 0.04$).

Conclusion: Children with FAPD have greater sleep spindle density, higher arousal indices, decreased proportions of NREM3 sleep and lower Delta power, indicative of diminished slow wave sleep (SWS) compared to healthy peers. Reductions in SWS may be indicative of common neurotransmitter pathways shared between sleep and chronic pain syndromes, or secondary to sleep disruption associated with pain. Future studies can assess the impact of these changes on GI symptoms and psychological functioning in this population.

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0912

ADOLESCENT PERSPECTIVES ON INSOMNIA TREATMENT: A QUALITATIVE ANALYSIS

Zainab Baig¹, Sarah Honaker², Stacey Simon³, Lisa Meltzer⁴, Kelly Byars⁵, Danielle Simmons⁵, Ariel Williamson⁶, Elizabeth Koval⁷, Maureen McQuillan⁷

¹Indiana University Indianapolis, ²Indiana University School of Medicine, ³University of Colorado Anschutz Medical Campus, ⁴National Jewish Health, ⁵Cincinnati Children's Hospital Medical Center, ⁶The Ballmer Institute for Children's Behavioral Health, University of Oregon, ⁷Indiana University School of Medicine, Riley Hospital for Children

Introduction: Insomnia is common during adolescence and can negatively affect physical, socio-emotional, and academic functioning. Treatments for insomnia exist but may not be acceptable or feasible for teens. This study explores perceptions about sleep treatment needs and preferences among adolescents with insomnia.

Methods: Adolescents ($n = 1,990$, aged 13-18) who endorsed insomnia symptoms were recruited via social media from the US, the UK, Canada, Australia, and New Zealand. Participants completed a survey about insomnia treatment preferences and responded to an open-ended question asking, "In your own words, tell us how you would most like to get help with your insomnia." Responses were then qualitatively coded into non-mutually exclusive categories using rapid qualitative analysis. Inter-rater agreement was 91%.

Results: Three common themes emerged in response to the open-ended question about how adolescents would most like their insomnia to be treated: 1) Medication ($n = 726$, endorsed by 36% of respondents), 2) Talking to someone, (e.g., a therapist; $n = 455$, 23%), and 3) Anything that works ($n = 179$, 9%). Other categories within the healthcare context included Talking to a doctor ($n = 73$, 4%) and Getting a sleep study ($n = 25$, 1%). Self-help programs of differing modalities including phone applications, websites, text services, and workbooks, were also preferred by some adolescents ($n = 155$, 8%). Respondents further expressed interest in Relaxation strategies (e.g., learning ways to reduce anxiety, manage distressing thoughts before bed, or learn relaxation, meditation, or stress reduction techniques; $n = 118$, 6%). Education or advice on sleep ($n = 99$, 5%) and Research on the causes of insomnia ($n = 51$, 3%) also emerged as themes.

Conclusion: This study is the first to examine treatment preferences in a large, international sample of adolescents with insomnia. Although medication was the most frequently identified approach, adolescents' preferences varied greatly and revealed openness to non-medication strategies such as counseling or relaxation strategies.

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0913

ATO-OXY TREATMENT FOR OSA IMPROVES INSOMNIA SYMPTOMS IN CHILDREN WITH DOWN SYNDROME

Daniel Combs¹, Jamie Edgin², Chiu-Hsieh Hsu¹, Michelle Wei¹, Kenneth Bottrill¹, Sicily La Rue¹, Lauren Melcher¹, Adam Dean¹, Natalie Provencio-Dean¹, Sairam Parthasarathy¹

¹University of Arizona, ²Virginia Tech

Introduction: Obstructive sleep apnea (OSA) is highly prevalent in children with Down syndrome with estimated prevalence of 45-79%. Current OSA treatments for children with Down syndrome have limited effectiveness, as positive airway pressure therapy is poorly tolerated and adenotonsillectomy is not curative for most children with Down syndrome. The combination of atomoxetine and oxybutynin (ato-oxy) is a promising treatment for OSA in children with Down syndrome. Studies of ato-oxy (and the related treatment AD109, atomoxetine and aroxybutynin) in adults without Down syndrome have identified insomnia as a common adverse effect of treatment that may lead to discontinuation of treatment. Therefore, we evaluated the impact of ato-oxy on insomnia symptoms in children with Down syndrome and OSA.

Methods: The pediatric insomnia severity index (PISI) was used to evaluate insomnia symptoms in participants in an ongoing clinical trial of ato-oxy for OSA for children (age 6-17 years) with Down syndrome. Participants received 6 months of ato-oxy treatment (0.5 mg/kg atomoxetine and 5 mg oxybutynin). Paired t-tests were used to compare PISI scores at baseline and after treatment.

Results: 12 participants had data at both baseline and after 6 months of ato-oxy. Baseline sleep onset problem score was 5 ± 3.7 which improved to 3.3 ± 2.0 following ato-oxy treatment ($p=0.04$). Baseline sleep maintenance problem score was 6 ± 3.0 and improved to 3.4 ± 1.9 following ato-oxy treatment ($p=0.005$).

Conclusion: In contrast to ato-oxy treatment in typically developing adults, OSA treatment with ato-oxy in children with Down syndrome showed improvement in insomnia symptoms. Ato-oxy may be particularly beneficial for children with Down syndrome and comorbid insomnia and OSA, particularly as positive airway pressure therapy is often associated with worsened insomnia. These results also highlight the need for studies in special populations as results in typically developing populations may not be generalizable to special populations.

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0914

CATCHING Z'S: DEVELOPMENT OF A CHATBOT-BASED SLEEP INTERVENTION FOR ADOLESCENTS WITH AUTISM SPECTRUM DISORDER

Xiaopeng Ji¹, Fatou Marong¹, Lauren Covington¹, Seema Rani², Abigail Strang²

¹University of Delaware, ²Nemours Children's Hospital

Introduction: Sleep disturbances are highly prevalent among autistic adolescents and adversely affect neurobehavioral, emotional, and social functioning. Artificial intelligence chatbots show promise for delivering scalable sleep coaching, but have not been adapted for this population. This study aimed to design and pilot-test Catching Z's, an app-based, chatbot-integrated sleep intervention for autistic adolescents with poor sleep health.

Methods: Building on a CBT-I-based chatbot our team previously developed for young adults, we developed Catching Z's using a design-thinking approach involving: (1) two focus groups with 16 autistic adolescents and caregivers to assess needs and preferences for an AI-chatbot; (2) expert consultation with sleep and autism specialists to develop the prototype; and (3) think-aloud usability testing with five autistic adolescents to refine the intervention. We then conducted a 4-week, single-arm beta test. Feasibility, usability, and acceptability were evaluated using completion and retention rates, the Adapted System Usability Scale (SUS), acceptability ratings, and post-intervention interviews.

Results: Insights from focus groups and prototype testing informed intervention components: (1) a rule-based chatbot delivering four structured sleep-coaching modules with visual supports and sensory-friendly design; (2) a natural-language-processing chatbot for real-time Q&A; (3) daily sleep tracking with graphic feedback; and (4) weekly to-do lists and milestone badges. For beta-testing, five autistic adolescents (ages 14-17; three female) have been enrolled to date, with a target sample of 10-15. Personalized coaching schedules and weekly summaries were provided to parents. All adolescents completed the 4-week intervention; three followed the schedule and two required additional reminders. The average SUS score (67) approached the favorable usability threshold (68), and 80% reported confidence using the chatbot to support sleep improvements. All adolescents rated the intervention acceptable or highly acceptable. In interviews, all adolescents reported improvements in sleep knowledge, engagement in sleep hygiene practices, and overall sleep quality. They described the app as user-friendly and flexible while recommending enhancements, including more concise dialogue, richer visuals, and adaptive reminders.

Conclusion: The chatbot-based sleep intervention appears feasible and acceptable, with autistic adolescents providing valuable suggestions for refinement. Catching Z's also shows promising potential for improving sleep health, warranting further efficacy trials.

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0915

DEVELOPMENT OF A COMMUNITY-ENGAGED SLEEP INTERVENTION TO SUPPORT SCHOOL-AGE CHILDREN ON THE AUTISM SPECTRUM: PRELIMINARY FINDINGS

Megan Wenzell¹, Camdyn Roark², Sambridhi Khanal³, JES-Rite Michaels², Ronald Hickman², Stephanie Griggs⁴, James (Jim) Spilsbury¹, Carolyn Ievers-Landis⁵, Andrew Schlegelmilch⁶, Nicholas Schiltz¹, Mary Dolansky², Max Wiznitzer⁷

¹Case Western Reserve University, ²Case Western Reserve University Frances Payne Bolton School of Nursing, ³Case Western Reserve University School of Medicine, ⁴Emory University, ⁵Rainbow Babies & Children's Hospital/University Hospitals Cleveland Medical Center, ⁶Private Practice for Children, Adults and Families Specializing in Working with Neurodiverse Individuals, ⁷UH Rainbow Babies and Children's, Case Western Reserve University School of Medicine

Introduction: Sleep disturbances occur at twice the rate in children on the autism spectrum compared to the general pediatric population, yet effective treatments for school-age children with autism remain limited. To address this gap, we adapted the Transdiagnostic Sleep and Circadian Intervention-Youth intervention for children with autism (TranS-C-Youth Autism). This report summarizes the feasibility and acceptability findings of a 12-week telehealth parallel-group randomized controlled trial comparing TranS-C-Youth Autism to a time-balanced enhanced usual care (EUC) condition.

Methods: We recruited a convenience sample of children with ASD (ages 6–12) and moderate or greater sleep disturbances without a known history of moderate-to-severe sleep apnea from clinical and community sources. Both groups participated in 5 telehealth-delivered sessions over 3 months, with assessments at baseline, 3, and 6 months. The primary outcomes include the Pediatric Sleep Clinical Global Impressions Scale (CGI) and the Pediatric Autism Insomnia Rating Scale (PAIRS). Secondary outcomes include Aberrant Behavior Checklist-Irritability (ABC-I), Parenting Stress Index (PSI-SF), and the Parenting Sense of Competence Scale (PSOC). Children are asked to wear an actigraph for seven nights at baseline and post-intervention. Feasibility benchmarks include acceptability (Treatment Evaluation Inventory), treatment fidelity, parent engagement, attendance, and attrition.

Results: Ten children have been randomized (Mean age = 9.1 ± 2.0 years; 70% Male). Feasibility: Attendance and retention are 100%. Inter-rater reliability and parent adherence are high (intervention: $99.6\% \pm 1.0$ and 100%; EUC: $99.4\% \pm 1.8$ and 100%). Preliminary efficacy baseline measures indicate moderate severity (CGI-S = 5.0 ± 0.8 ; PAIRS = 24.2 ± 6.6), notable irritability (ABC-I = 11.7 ± 9.2 ; 50% $\geq$ cutoff), elevated parenting stress (PSI-SF = 91.5 ± 18.9 ; 60% above threshold), and lower parental self-efficacy (PSOC = 75.3 ± 12.8 ; 50% below average). Nine participants completed actigraphy (6.4 ± 0.7 nights), showing a mean sleep efficiency of $79.6\% \pm 4.2\%$ and total sleep of $8\text{ h }08\text{ m} \pm 38\text{ m}$.

Conclusion: This ongoing RCT indicates that the TranS-C-Youth Autism intervention is feasible regarding recruitment and delivery. These preliminary findings support the foundation for larger studies to evaluate the intervention's efficacy.

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0916

DISSEMINATION AND IMPLEMENTATION OF A SLEEP EDUCATION INTERVENTION BY COMMUNITY THERAPISTS IN CHILDREN WITH AUTISM

Beth Malow¹, Terry Katz², James Craig³, Sally Beboway⁴, Kasey Fitzpatrick¹, Margaret Faucett⁵, Susan Brasher⁵

¹Vanderbilt University Medical Center, ²Children's Hospital Colorado, University of Colorado School of Medicine, ³Dartmouth-Hitchcock Medical Center, Department of Psychiatry, ⁴Vanderbilt University Medical Center, Department of Neurology, ⁵Nell Hodgson Woodruff School of Nursing Emory University

Introduction: A critical need exists for sleep education models that are both practical and tailored to families of children with autism, given their high prevalence of sleep problems. Community therapists, often on the front lines working with these families, represent a promising group for delivering behavioral sleep education to this population. We are evaluating the dissemination and implementation of a sleep education intervention for children with autism through community therapist training.

Methods: A multiregional advisory board—including therapists, pediatricians, nurse practitioners, sleep experts, and parents—guides the development, implementation, and evaluation of the program across four U.S. states (Tennessee, Georgia, Colorado, and New Hampshire). Therapists have access to evidence-based materials developed previously by the research team, located in Canvas Learning Management System, an on-line portal. Thirty-one therapists from occupational therapy, speech-language pathology, early intervention, and behavioral therapy backgrounds completed a flexible training model that included self-study of the manualized curriculum, followed by live role-play sessions with sleep experts. Parents (of children 2–12 years with autism and sleep problems) were recruited by trained community therapists and completed pre- and post-education sleep questionnaires, including the Children's Sleep Habits Questionnaire (CSHQ) and the Family Inventory of Sleep Habits (FISH) via Research Electronic Data Capture (REDCap). CSHQ and FISH scores at baseline and post-intervention were analyzed using Wilcoxon signed-rank tests.

Results: To date, 39 parents have completed baseline assessments, and 10 have completed pre- and post-education assessments. Significant improvements from baseline to post-intervention in child sleep patterns and family sleep habits were achieved. Average total CSHQ scores at baseline (41.9 ; SD 8.2) improved post-education (35.2 , SD 7.3 ; $p = 0.008$). Average total FISH scores at baseline (43.6 ; SD 6.9) improved post-education (46.4 ; SD 4.9 ; $p = 0.045$).

Conclusion: This novel therapist-delivered model demonstrates early success in implementation, feasibility, and observed sleep patterns and habits within a small sample of children. Challenges include recruitment of families and obtaining post-education survey data. Ongoing iterative refinement, guided by advisory board input and therapist feedback, aims to address these challenges. This program has the potential to enhance access to sleep education for children with autism.

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0917

PROJECT SLEEP: A BRIEF, ONLINE SINGLE SESSION INTERVENTION TARGETING SLEEP TO IMPROVE MENTAL HEALTH IN YOUNG PEOPLEJessica Hamilton¹, Jas Sarna¹, Melissa Dreier¹, Aijia Yao¹, Maria Loades², Faith Orchard³¹Rutgers University, New Brunswick, ²University of Bath,³University of East Anglia

Introduction: Poor sleep has been linked to a range of negative physical and mental health outcomes in young people. Although effective treatments exist, issues with accessibility and engagement remain. Project Sleep is a Single Session Intervention (SSI) developed based on behavioral principles of evidence-based treatments and structured according to SSI principles. Developed with young people in the US and UK, participants receive sleep psychoeducation, engage in a personalized activity focused on behavioral principles for their sleep problem (e.g., insomnia, sleep irregularity), and develop an action plan. The current study is an international collaboration of a pre-post programme evaluation to test the preliminary effectiveness of Project Sleep for motivation to improve sleep.

Methods: A total of 1,027 young people (ages 13-25 years) who self-identify as having sleep problems participated in Project Sleep. Participants were recruited from the community in the US and UK and through participant registry pools at the universities. The mean age was 18.79 years, 79% identified as girls, and 46% had minoritized racial/ethnic identities. Participants completed a program feedback scale (1-5), as well as their motivation, control, and readiness to improve sleep rated pre-post SSI (on 0-10 scale; 10 = most).

Results: Most participants reported 6.79 hours of sleep per night (SD=1.48) and most (80%) reported clinical insomnia symptoms (ISI=11.73; 8-23). Participants reported their biggest sleep challenge as “difficulty falling or staying asleep” (41%), “trouble keeping a regular sleep schedule” (40%), or “Not feeling ready for sleep at bedtime” (19%). On average, Project Sleep took 18.19 minutes (SD=11.89). Participants agreed the program was easy (M=4.69), helpful (M=4.39), and would recommend it to a friend (M = 4.30). Participants’ ratings increased pre-to-post SSI across all domains, with most notable gains for perceived importance of improving sleep (pre=7.48; post=8.73) and control over improving sleep (pre=4.97; post=6.88).

Conclusion: Project Sleep demonstrated initial acceptability and effectiveness for enhancing knowledge about and motivation to improve sleep. Project Sleep has the potential to improve scalability of access to effective, evidence-based strategies to improve sleep and health among young people.

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0918

ASSOCIATION OF PHYSICAL ACTIVITY WITH MULTIDIMENSIONAL SLEEP HEALTH IN ADOLESCENTS: IMPACT OF WEIGHT GAIN SINCE CHILDHOODAllison Luongo¹, Casandra Nyhuis², Kristina Lenker¹, Susan Calhoun³, Alexandros Vgontzas¹, Duanping Liao¹, Edward Bixler¹, Julio Fernandez-Mendoza⁴¹Penn State College of Medicine, ²Johns Hopkins University,³Penn State Health, ⁴Penn State University, Hershey

Introduction: Adolescents have unique sleep needs that impact their physical and mental wellbeing. The adolescent transition is also characterized by decreases in physical activity (PA) and increases in sedentary behavior (SB), which may have further deleterious effects on sleep beyond weight gain and obesity. Few longitudinal studies have examined synergistic effects between PA/SB and weight gain on sleep health in the transition from childhood to adolescents.

Methods: We studied 341 subjects from the Penn State Child Cohort aged 5-12 years old (median 9 years old) at baseline and 12-23 years old (median 16 years old) at follow-up (53% male, 21% racial/ethnic minority) who underwent in-lab polysomnography (PSG), had at least 3 valid nights of actigraphy (ACT) and completed self-reported questionnaires. The primary outcome was a data-driven, multivariable, multimethod sleep health score adapting the RU-SATED framework to include Breathing, Efficiency, Duration, REGularity, Satisfaction, and Timing (BEDREST) measured by PSG, ACT and self-reports. The BEDREST score ranged from 0 to 6, with higher values indicating better sleep health. Predictors included ACT-measured SB and moderate-to-vigorous PA (MVPA). Moderators included body mass index (BMI) and waist circumference (WC) and their change (Δ) from childhood to adolescence. Linear regression adjusted for age, sex, race/ethnicity, socioeconomic status, being in-school, internalizing symptoms, and externalizing behaviors as well as height and childhood values, as appropriate.

Results: Longitudinally, Δ WC modified the association of SB (p-interaction < 0.001) and MVPA (p-interaction = 0.023) with BEDREST score; a modifying role that was weaker for Δ BMI (p-interaction = 0.060). Among children who gained most central adiposity (Δ WC $\geq$ 24cm), greater SB was associated with a lower BEDREST score (Est=-2.04, SE=0.42, p< 0.01). Cross-sectionally, WC (p-interaction=0.021) and BMI (p-interaction=0.020) modified the association of SB, but not MVPA, with BEDREST score. Among obese adolescents (BMI% $\geq$ 95), greater SB was associated with a lower BEDREST score (Est=-1.04, SE=0.39, p=0.01).

Conclusion: Being sedentary negatively impacts sleep health among adolescents who gain central adiposity since childhood and are obese in adolescence. Less MVPA positively impacts sleep health in a small group of adolescents who lost central adiposity since childhood, which may suggest adequate timing of exercise.

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0919

IMPACT OF CIRCADIAN MISALIGNMENT ON THE ASSOCIATION OF SEDENTARISM WITH WEIGHT GAIN FROM CHILDHOOD TO ADOLESCENCEAllison Luongo¹, Natasha Morales-Ghinaglia², Kristina Lenker¹, Susan Calhoun³, Alexandros Vgontzas¹, Duanping Liao¹, Edward Bixler¹, Julio Fernandez-Mendoza⁴¹Penn State College of Medicine, ²Geisinger Commonwealth School of Medicine, ³Penn State Health, ⁴Penn State University, Hershey

Introduction: Adolescence is a developmental period marked by significant changes in sleep, particularly in circadian timing. This transition is also characterized by declines in physical activity (PA) and increases in sedentary behavior (SB), which, combined with

sleep changes, may exacerbate weight gain and obesity. However, few longitudinal studies have examined how sleep timing modifies the impact of PA/SB on weight gain in the transition from childhood to adolescence.

Methods: We studied 307 subjects from the Penn State Child Cohort aged 5-12 years old at the childhood visit and 12-19 years old at the adolescent visit (53% male, 23% racial/ethnic minority) who underwent in-lab polysomnography and had at least 3 valid actigraphy (ACT) nights. Predictors included ACT-measured SB and moderate-to-vigorous PA (MVPA). Moderators included ACT-measured sleep duration, variability, midpoint, and irregularity. Outcomes were change in body mass index (Δ BMI) and in waist circumference (Δ WC) from childhood to adolescence. Stepwise linear regressions adjusted for age, sex, race/ethnicity, socioeconomic status, being on school breaks, apnea/hypopnea index, insomnia symptoms, internalizing symptoms, and externalizing behaviors as well as height and childhood baseline values, as required.

Results: Sleep irregularity (p -interaction = 0.014) and, to a lesser extent sleep midpoint (p -interaction = 0.09), modified the association between SB with Δ WC. Similar, but weaker findings, were observed with Δ BMI (e.g., sleep irregularity p -interaction = 0.059). Among adolescents with highest sleep irregularity (≥ 2 hours), greater SB was associated with a larger increase in Δ WC since childhood (Est=9.28, SE=3.59, $p=0.01$). No significant effect modification was found for sleep duration or variability or for the association between MVPA and weight gain.

Conclusion: This study is among the first to evaluate longitudinal synergistic effects of sedentarism on weight gain by sleep irregularity. The impact of sedentarism on weight gain is stronger in adolescents with misalignment in the circadian timing of sleep. Implementing interventions that target circadian sleep timing, combined with strategies to increase physical activity, may help to reduce weight gain and prevent central obesity in the transition from childhood to adolescence.

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0920

IMPACT OF ELEVATED PERIODIC LIMB MOVEMENT INDEX AND OSA ON BLOOD PRESSURE IN CHILDREN

Aashka Sheth¹, Niraj Rama¹, Jawad Kahir¹, Prasad Malavika¹, Michael Orangias¹, Brandon Peters², Karim El-Kersh³, Egambaram Senthilvel¹

¹University of Louisville School of Medicine, ²Norton Healthcare,

³University of Arizona College of Medicine

Introduction: The combination of obstructive sleep apnea (OSA) and elevated periodic limb movement index (PLMI) may have an increased impact on blood pressure (BP). Our aim of this study was to assess the impact of both OSA and elevated PLMI on BP in children with OSA and elevated PLMI.

Methods: This study was a single-center retrospective analysis of children under 18 years old who had an OSA and PLMI > 5 and had their BP recorded before and after sleep studies. OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 1.5 events/hr), mild (1.5–4.9 events/h), moderate (5–9.9 events/h), and severe (≥ 10 events/h). BP was categorized as normal, elevated, or stage 1 or 2 hypertension according to AAP 2017 guidelines.

Results: 176 children with a PLMI of greater than 5 events per hour with recorded pre/post PSG blood pressures during sleep studies data were analyzed. Primary snoring, mild, moderate, and severe OSA were 43.8%, 26.7%, 11.9%, and 17.6%, respectively. The median age in each group was 9, 10, 9, and 13, respectively. The BMI z-score for each group was 0.9, 1.8, 2.3, and 2.4, respectively ($p = 0.0002$). BP categories were normal (64.5%, 34.0%, 38.1%, and 25.8%), elevated (11.8%, 25.5%, 14.3%, and 25.8%), stage 1 HTN (19.7%, 34.0%, 42.9%, and 29.0%), and stage 2 HTN (4.0%, 6.4%, 4.8%, and 19.4%) in each group. Between all groups, there was no significant difference seen in the PLMI and PLM arousal index. OSA severity was strongly and independently correlated with higher BP, particularly systolic BP (SBP) ($p < 0.0001$). A higher PLMI was also notably linked to increased morning systolic BP. Specifically, for each one-point rise in the PLMI the SBP increased by 0.27 mmHg ($p = 0.010$). However, when adjusting for age and BMI z-score, this association was no longer statistically significant ($p = 0.066$).

Conclusion: OSA severity is the main factor linked to higher blood pressure in children with OSA and elevated PLMI, while PLM indices were less influential on BP after accounting for age and BMI.

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0921

REST-ACTIVITY CHRONOTYPE AND SLEEP DISTURBANCES IN CHILDREN WITH EPILEPSY

Feng-Hsiang Cheng¹, Shao-Yu Tsai²

¹School of Nursing, College of Medicine, National Taiwan University, Taipei, Taiwan, ²National Taiwan University

Introduction: Children with epilepsy experience higher rates of sleep disturbances than their healthy peers, which may adversely affect seizure control and daytime functioning. Chronotype, reflecting individual differences in circadian phase, has been shown to influence sleep timing and quality in pediatric populations. However, limited research has examined how chronotype, as indexed by objective rest-activity patterns, relates to caregiver-reported sleep problems in children with epilepsy.

Methods: In this ongoing cross-sectional study, 37 child-caregiver dyads (children aged 1.5–9 years) were recruited from a pediatric neurology clinic in northern Taiwan. Caregivers completed demographic questionnaires and the Children's Sleep Habits Questionnaire (CSHQ). Children wore wrist actigraphy devices continuously for seven consecutive days. Chronotype was estimated using the actigraphy-derived acrophase of the 24-hour rest-activity rhythm.

Results: The mean acrophase time was 14:38 $\pm$ 0:54. The average CSHQ total score was 52.19 $\pm$ 7.59, with 94.6% of children ($n = 35$) scoring above the clinical cutoff of 41, indicating a high prevalence of sleep difficulties. Later acrophase times were significantly correlated with higher CSHQ subscale scores for sleep duration problems ($r = .47$, $p < .01$), parasomnias ($r = .36$, $p = .03$), and sleep-disordered breathing ($r = .47$, $p < .01$). Earlier acrophase times were associated with longer daily sleep duration measured by actigraphy ($r = -.43$, $p < .01$). In multivariable linear regression models adjusting for relevant covariates, later acrophase remained a significant predictor of greater sleep duration problems ($\beta = .45$, $p = .01$) and sleep-disordered breathing ($\beta = .55$, $p < .01$).

Conclusion: A later chronotype, as reflected by delayed rest-activity acrophase, was associated with greater caregiver-reported sleep problems and shorter objective sleep duration in children with epilepsy. These findings suggest that circadian timing may play an important role in sleep health in this population. Interventions supporting earlier and more stable sleep-wake schedules may help mitigate sleep-related difficulties. Future studies with larger samples and longitudinal designs are needed to better understand factors influencing chronotype and its clinical implications in pediatric epilepsy.

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0922

SLEEP DEPTH AND CARDIAC AUTONOMIC MODULATION IN ADOLESCENTS: IMPACT OF ENTRAINMENT TO SCHOOL SCHEDULES

Anthony Rahawi¹, Jidong Fang¹, Susan Calhoun², Alexandros Vgontzas¹, Duanping Liao¹, Edward Bixler¹, Julio Fernandez-Mendoza³

¹Penn State College of Medicine, ²Penn State Health, ³Penn State University, Hershey

Introduction: Prior studies in adolescents show that the odds ratio product (ORP), an EEG measure of sleep depth, and ORP-9, an EEG measure of cortical arousability, are associated with heart rate variability (HRV), an EKG measure of cardiac autonomic modulation (CAM). Specifically, higher ORP (i.e., shallower sleep) and ORP-9 (i.e., increased cortical arousability) are both associated with decreased low-frequency HR oscillations (Log-LF) and decreased standard deviation between normal sinus rhythms (SDNN), indicating increased risk of developing cardiovascular disease. These associations have not been evaluated in the natural context of adolescents having to entrain to the academic school schedule (i.e., in-school) or during free vacation days (i.e., on-break).

Methods: We studied 344 adolescents from the Penn State Child Cohort (median 16 years; 47% female; 23% racial/ethnic minority), of whom 215 were evaluated while in-school. We extracted ORP and ORP-9 during NREM sleep from 9-hour, in-lab polysomnography (PSG) and Log-LF and SDNN from Holter EKG monitoring during the 24 hours after PSG. Linear regression models examined the associations of ORP and ORP-9 with 24-hour HRV indices stratified by whether the participant was evaluated while in-school or on-break. Covariables included sex, race/ethnicity, age, BMI percentile, metabolic syndrome, insomnia symptoms, PSG-measured sleep apnea, and actigraphy-measured sleep duration.

Results: Amongst adolescents evaluated while in-school, higher ORP was associated with lower Log-LF and SDNN as well as higher HR during the daytime (Log-LF: $p=0.017$; SDNN: $p=0.010$; HR: $p=0.012$) and nighttime (Log-LF: $p<0.001$; SDNN: $p=0.003$; HR: $p=0.008$). Higher ORP-9 was associated with the same HRV indices and HR during the daytime (Log-LF: $p=0.005$; SDNN: $p=0.003$; HR: $p=0.022$) and nighttime (Log-LF: $p=0.006$; SDNN: $p=0.007$; HR: $p=0.021$) amongst adolescents evaluated while in-school. No significant associations were found among adolescents evaluated while on-break (all $p>0.10$).

Conclusion: Shallow sleep and high cortical arousability contribute to impaired CAM most when adolescents are in school. These findings highlight the importance of the context in which

an adolescent is assessed and its impact on the associations between the sleeping brain and cardiac health.

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0923

IMPACT OF RESPIRATORY EVENTS ON PERIODIC LIMB MOVEMENT ACTIVITY THROUGHOUT THE NIGHT

Aashka Sheth¹, Niraj Rama¹, Jawad Kahir¹, Brandon Peters², Karim El-Kersh³, Egambaram Senthilvel¹

¹University of Louisville School of Medicine, ²Norton Healthcare,

³University of Arizona College of Medicine

Introduction: Obstructive sleep apnea (OSA) can frequently occur concurrently with elevated periodic limb movements index (PLMI). A limited number of studies have assessed whether PLMS are more prevalent in certain sleep stages or sleeping positions. Our aim was to identify the correlation of PLMs distribution in different sleep stages and body positions, in children with and without OSA.

Methods: This study was a single-center retrospective analysis of children under 18 years old who had elevated PLMI > 5 event/hr. Respiratory event and PLMs in different sleep stages and body positions report regenerated. OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 1.5 event/hr), mild (1.5–4.9 events/h), moderate (5–9.9 events/h), and severe (≥ 10 events/h).

Results: A total of 95 children who had elevated PLMI > 5 event/hr were analyzed for differences in PLMs and respiratory events between the first and second half of the night. Primary snoring, mild, moderate, and severe OSA made up 26.3%, 25.3%, 23.2%, and 25.2% of the patient population respectively. The overall PLMI decreased from the first to the second half of the night in the non-OSA (-2.1 ± 14.8), mild (-2.2 ± 12.5), and moderate (-2.3 ± 18.3) groups, while it slightly increased in the severe group (2.1 ± 17.0), but these results were not statistically significant, indicating that OSA severity does not significantly influence how the PLMI evolves over the course of the night ($p = 0.727$). Similarly, none of the other PLM metrics showed a significant difference in night-to-night changes across OSA groups. PLMI in sleep stages N1, N2, N3, and REM all had p values > 0.09 , indicating no correlation with OSA severity. Similarly, PLMI for different body positions did not have a significant difference in night-to-night changes across OSA groups (all $p > 0.53$).

Conclusion: There was no statistically significant effect of OSA severity on intra-night changes in PLMs metrics. Similarly, no significant differences were observed in the night-half change for sleep stage-specific or position-specific PLM metrics across OSA categories. This suggests that the dynamics of PLMs activity throughout the night are not substantially modulated by the presence or severity of OSA.

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0924

PATHWAYS TO CARE: ASSESSING THE IMPACT OF REFERRAL SOURCES ON LONGITUDINAL WAIT TIMES

Matthew Balog, Darius Loghmanee, Innessa Donskoy, Ayelet Snow

Advocate Children's Hospital

Introduction: Excessive wait times regarding pediatric sleep disorders is an issue without borders. Within the United States, wait times can be exacerbated due to issues such as insurance coverage, socioeconomic status, and the limited number of pediatric sleep medicine specialist and technologists. Implications of delays in OSA diagnosis and treatment are well documented. To mitigate these impacts and streamline wait times, a direct to sleep lab referral process for providers who were trained to identify sleep related breathing disorders (SRBD) by our department was created. This study analyzes diagnostic longitudinal wait times (LWT), as defined by the initial identification of SRBD symptoms to the interpretation of the patient's PSG, between different referring providers.

Methods: In this retrospective chart review, an electronic medical record (EMR) query for all patients who completed a pediatric outpatient in-lab polysomnography from 1/1/2025 through 6/30/2025 was performed. Patients without wait time data as well as ordering provider categories with under 5 PSGs were excluded from the dataset. The query yielded a convenience sample of 620 subjects.

Results: Four ordering provider categories were identified. A one-way ANOVA determined there was a statistically significant difference between group means ($F(3,616)=28.46, p<0.001$). The average LWT was significantly lower for the PCP category as compared to the other three groups (PCP = 86 days, ENT = 180 days, Pulmonary = 181 days, and Sleep = 190 days).

Conclusion: This study demonstrates that patient pathways to care can have a drastic impact on wait times. While PSG order volumes tend to originate from specialty care, it is the PCP pathway that offers patients the most direct route to diagnosis. Through close collaboration PCPs can be empowered to step into a sleep-forward role, thereby reducing wait times and expediting care. While further study is required to evaluate other aspects of care delays, such as time to treatment, the results suggest training front-line resources is a viable way to expedite care for children.

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0925

ACCURACY OF TEXT MESSAGE-BASED SLEEP DIARY FOR ASSESSMENT OF SLEEP TIMING AND DURATION IN YOUTH

Sara Malina¹, Cynthia Wang², Sheela Magge², Andrea Kelly³, Francis Sgambati², Jonathan Jun², Talia Hitt²

¹University of Maryland School of Medicine, ²Johns Hopkins University School of Medicine, ³Children's Hospital of Philadelphia

Introduction: Accurate assessment of sleep timing/duration is essential for research and clinical practice. Sleep diaries are an inexpensive and convenient method for assessing sleep, but their accuracy in youth remains unclear. Our research group has used text-messages to administer electronic sleep diaries, which have shown high response rates and rapid response times. We hypothesize that these diaries yield accurate self-reported sleep timing and duration compared to sleep/wake estimation from concomitantly worn wrist actigraphy.

Methods: Youth 12-21y wore wrist actigraphy (ActiGraph GT3XP-BTLE) and completed twice-daily text-message sleep diaries for 2 weeks. Sleep timing and duration were derived using Cole-Kripke

and Tudor-Locke algorithms. Mean sleep onset, offset, duration, and wake after sleep onset (WASO) were compared between actigraphy and sleep diary methods using Wilcoxon rank sum and Bland-Altman analyses. Demographic factors associated with improved diary-actigraphy agreement were assessed using linear regression.

Results: Participants ($n=71,52.1\%F$) with median (IQR) age 19.1y(17.5,21.0) completed actigraphy and sleep diaries. Average sleep onset, offset, and duration were similar between the two assessment methods by Wilcoxon rank sum ($p=0.95$ (onset), $p=0.15$ (offset), $p=0.56$ (duration)). The absolute magnitude of difference [median(IQR)] was 24.3min (8.4,40.2) for sleep onset, 29.4min (12.5,46.1) for sleep offset, and 36.8min (17.1,68.6) for sleep duration. Per Bland-Altman analysis, the mean differences between diary and actigraphy (positive=diary overestimated) were 1.9min (onset), -5.8min (offset), and -5.3min (duration). 95% limits of agreement were -79.16 to 66.9 minutes (onset), -185.8 to 91.2 minutes (offset), and -94.1 to 58.4 minutes (duration). Proportional bias was 6.6min difference per delayed hour sleep offset, but none was present in onset and duration. There was no heteroscedasticity for any parameter. WASO was significantly different between diary data and actigraphy ($p<0.001$). Female sex was associated with improved accuracy of reported sleep duration ($p=0.028$) but not sleep timing, and age and socioeconomic status were not associated with accuracy of any metric.

Conclusion: Text-message sleep diaries may provide accurate assessment of sleep onset, offset, and duration in youth when compared to actigraphy, but do not accurately capture WASO. Proportional bias in sleep offset suggests delayed awakening is associated with decreased accuracy in reported offset. Most demographic factors were not associated with reporting accuracy.

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0926

SUCCESSFUL COMPLETION OF POLYSOMNOGRAPHY IN CHILDREN WITH NEURODIVERGENCE AND ANXIETY WITH USE OF AN INDIVIDUALIZED DESENSITIZATION PROTOCOL

Seema Rani¹, Taylor Maclean², Nandini Jhawar², Jodi Gustave², Aaron Chidekel¹, Grace Wang²

¹Nemours Children's Hospital, ²Nemours Children's Health

Introduction: Children with autism, sensory processing difficulties, and anxiety often have challenges tolerating polysomnography (PSG) – the gold standard for diagnosing sleep-disordered breathing. The extensive hook-up is often poorly tolerated, contributing to patient and familial stress, increased likelihood of early study termination, and insufficient sleep time and data. Behavioral desensitization prior to PSG can reduce fear responses to medical stimuli and improve tolerance. This project aimed to assess PSG sleep architecture parameters in children with neurodivergence and anxiety after undergoing a desensitization protocol by sleep psychology.

Methods: Children ages 2-17 years with autism, sensory processing disorder, anxiety disorders, and fear of other medical care were included. Demographic and PSG data were collected from the medical record on patients referred to sleep psychology who underwent desensitization. The desensitization protocol incorporated principles of behavioral reinforcement

and graduated exposure to increase patients' tolerance of wearing PSG materials (electroencephalography, nasal cannula, pulse oximetry, head wrap, respiratory belts). Interventions included psychoeducation, social story video, and structured sensory exploration of materials. Interventions and number of sessions were individualized based on age, co-morbidities, and needs. Psychologists monitored distress, taught adaptive coping, provided behavioral reinforcement, and encouraged practice with sensory substitutions between desensitization appointments. Prior to PSG, psychologists communicated the child's progress and effective coping strategies to sleep technologists to facilitate successful study completion.

Results: Our cohort (total 29 patients) constituted 59% males, 41% females, a mean age of 10 years, 48% patients with autism, 7% with sensory processing disorder, and 59% with an anxiety disorder or fear of medical care. With desensitization, 96% patients achieved valid polysomnography duration and data, enabling a diagnosis to be made. The median total sleep time was 409 minutes. The median sleep efficiency was 85%. Forty-eight percent of children demonstrated sleep efficiency greater than 85%. Fifty-nine percent of children achieved all sleep stages. Average N3 sleep was 34%. Sleep onset latency was variable (mean 45 minutes, range 246 minutes).

Conclusion: This study demonstrates that successful completion of PSG (sufficient sleep duration, sleep efficiency, and sleep architecture) is achievable – even in children with neurodivergence or anxiety – after undergoing an individualized desensitization protocol.

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0927

ASSOCIATIONS BETWEEN DAILY GPS-BASED NEIGHBORHOOD PHYSICAL DISORDER AND CRIME EXPOSURE AND ACTIGRAPHY-ESTIMATED SLEEP PATTERNS IN ADOLESCENTS

Stephanie Mayne¹, Gabrielle DiFiore¹, Hannah Martin¹, Vicky Tam¹, Jonathan Mitchell¹, Ian Barnett², Douglas Wiebe³, Mathias Basner², Alexander Fiks¹, Karen Glanz²

¹Children's Hospital of Philadelphia, ²University of Pennsylvania,

³University of Michigan

Introduction: While growing evidence suggests that neighborhood safety and disorder may impact adolescent sleep, prior research has not accounted for travel outside the home neighborhood, which may misclassify environmental exposures. This study examined associations of neighborhood physical disorder and crime in adolescents' daily activity spaces with sleep patterns.

Methods: In a micro-longitudinal study, 142 adolescents aged 15-18 were followed for 14 days using smartphone GPS tracking and actigraphy. GPS locations recorded during adolescents' waking hours were linked to neighborhood physical disorder (number of vacant lots) and crime (annual count of part 1 crimes, e.g., homicide, assault) to derive daily average exposures in adolescents' activity spaces. Multivariable linear mixed effects regression estimated associations of daily neighborhood exposures with nightly actigraphy-assessed adolescent sleep duration and timing, and mixed effects modified Poisson regression estimated associations with risk of insufficient sleep (< 8 hours) and very short sleep (< 6 hours). Exposures were decomposed to assess between-person

differences (sleep differences based on adolescents' average exposures) and within-person differences (whether sleep differed on days where exposure was higher than their individual average). Models adjusted for school night status, month (for seasonality), adolescent age, sex, race/ethnicity, household income, parent education, parent marital status, distance from home to school, percent of GPS points >250 meters from home, and daily activity space neighborhood economic deprivation, social fragmentation, and tree canopy cover.

Results: Among participants, the average sleep duration was 6.5 hours. On days when adolescents' exposure to vacant lots was higher than their own average, they had shorter sleep duration, later sleep onset, earlier sleep offset, and higher risk of insufficient sleep (RR per IQR difference: 1.09, 95% CI: 1.02, 1.17) and very short sleep (RR: 1.23, 95% CI: 1.06, 1.44). Adolescents with higher average crime exposure had shorter sleep duration, earlier sleep offset, and higher risk of insufficient and very short sleep, but there were no within-person associations between crime and sleep outcomes.

Conclusion: Higher exposure to vacant lots and crime in adolescents' activity spaces was associated with more adverse sleep patterns. While associations do not necessarily indicate causal relationships, the findings may suggest intervention targets to improve adolescent sleep.

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0928

CONSISTENCY AND CONTEXT: BEDTIME ROUTINES AND SLEEP IN MEXICAN AMERICAN TODDLERS

Darcy Thompson¹, Melissa Fineman², Ariel Williamson³, Matthew Daley⁴, Suzanna Martinez⁵, Lisa Meltzer⁶

¹University of Colorado Anschutz Medical Campus, ²University of Colorado School of Medicine, ³The Ballmer Institute for Children's Behavioral Health, University of Oregon, ⁴Institute for Health Research, Kaiser Permanente Colorado, ⁵University of California, San Francisco, ⁶National Jewish Health

Introduction: Studies have demonstrated the importance of consistent bedtime routines for toddler sleep, yet few studies have considered whether specific routine behaviors (e.g., reading, playtime, massage) are associated with toddler sleep onset time and sleep duration once broader contextual factors are considered. This study evaluated associations between theoretically-based bedtime routine behaviors and toddler sleep (both actigraphy-estimated and parent-reported) in a large sample of Mexican American toddlers.

Methods: 238 mothers (age: 30.8+6.1 years; education: 12.4+2.8 years) of Mexican American toddlers (56% boys; 12-16 months) completed the Brief Infant Sleep Questionnaire (BISQ), and toddlers wore an actigraph for 7 nights. Bedtime routine behaviors (from BISQ items) were categorized into language-based (books, prayers, singing), touch-based (rocking, massage), and stimulating (screens, TV, play). Outcomes were actigraphic sleep-onset time and sleep duration, and parent-reported bedtime (BISQ). Covariates included parent-reported bedtime difficulty and BISQ bedtime routine consistency; child sleep location, age and sex; and parental age and education. Hierarchical regressions tested associations between bedtime routine behaviors and sleep.

Results: Bedtime routine behaviors were not significantly associated with actigraphic sleep-onset time (ps>.22). Instead, greater

bedtime routine consistency ($\beta = -0.159$, $p = .047$) and higher parental education ($\beta = -0.141$, $p < .001$) were associated with earlier sleep onset, while greater bedtime difficulty was associated with later sleep onset ($\beta = 0.297$, $p = .045$). Similarly, bedtime routine behaviors were not significantly associated with parent-reported bedtime ($p > .06$), but greater routine consistency ($\beta = -0.127$, $p = .002$), older parent age ($\beta = -0.026$, $p = .008$), and higher parent education ($\beta = -0.092$, $p < .001$) were associated with earlier reported bedtimes. Finally, language-based behaviors ($\beta = -0.154$, $p = .006$), touch-based behaviors ($\beta = -0.188$, $p = .007$), and bedsharing ($\beta = -0.461$, $p < .001$) were associated with shorter actigraphic sleep duration, while higher parent education was associated with longer actigraphic sleep duration ($\beta = 0.045$, $p = .019$).

Conclusion: Contrary to expectation, specific bedtime routine behaviors were not associated with actigraphic sleep onset time or subjective bedtime. Instead, findings highlight the importance of having a consistent bedtime routine and contextual factors, such as parent age, parent education, and bedsharing, when examining toddler sleep onset times and sleep duration. While future studies should consider bedtime routine behaviors in broader, more generalizable samples of toddlers, clinicians should emphasize the importance of consistent bedtime routines to ensure healthy toddler sleep.

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0929

MAPPING ASSOCIATIONS BETWEEN SLEEP AND COGNITIVE DOMAINS ESSENTIAL TO ACADEMIC PERFORMANCE IN TYPICALLY DEVELOPING ADOLESCENTS

Reut Gruber¹, Sujata Saha², Gail Somerville³, Rosalie Barbeau³

¹McGill University, ²Heritage Regional High School, ³Attention, Behavior & Sleep Lab Douglas Mental Health University Institute

Introduction: Adolescence is a critical developmental period characterized by biologically driven shifts in circadian rhythms and increasing academic and social demands, often resulting in later sleep timing, shorter sleep duration, and heightened stress related arousal. While inadequate sleep is linked to global cognitive functioning, the specific associations between sleep dimensions (duration, timing, pre sleep cognitive arousal) and cognitive domains fundamental to academic success and daily functioning remain unclear. Objective: To examine the differential associations between sleep duration, sleep timing, and pre sleep cognitive arousal with cognitive flexibility, processing speed, sustained attention, and attentional shifting in typically developing adolescents. Understanding these relationships is essential for developing targeted sleep based cognitive improvement interventions.

Methods: Forty nine adolescents (Mean age = 13.38 years, SD = 1.30 years) participated. Sleep duration and timing were measured over four consecutive school nights using wrist actigraphy and daily sleep logs. Pre sleep arousal was assessed with the Pre Sleep Arousal Scale. Cognitive performance was evaluated using a battery designed to assess complex and simple cognitive processes, including cognitive flexibility, processing speed, sustained attention, and attentional shifting.

Results: Findings revealed differential associations across sleep and cognitive dimensions. Later sleep timing and higher pre sleep

cognitive arousal were associated with poorer fluid cognitive processes, including flexibility and attention, whereas adequate sleep duration was robustly associated with better general executive function and faster processing speed.

Conclusion: Sleep health relates to multiple cognitive domains in distinct ways. A key limitation of the present study is its cross sectional design, which precludes causal inference. Future experimental studies should independently manipulate sleep duration, timing, and pre sleep arousal (e.g., sleep extension; circadian phase advancement via earlier bed/wake times and morning light; and pre sleep cognitive strategies), use objective sleep measures, and assess domain specific outcomes. Implications for schools: Scheduling and programming that support earlier and consistent sleep timing, reduce pre sleep cognitive arousal, and support adequate sleep duration align with the observed associations between sleep health and cognitive flexibility, attention, and processing speed.

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0930

PARENT-CHILD BED-SHARING IN SCHOOL-AGE CHILDREN WITH OVERWEIGHT AND OBESITY

Shao-Yu Tsai¹, Yi-Ching Tung², Chuen-Min Huang³, Chien-Chang Lee⁴, Shu-Yu Kuo⁵, Guanghai Wang⁶

¹National Taiwan University, ²National Taiwan University Children's Hospital, ³National Yunlin University of Science and Technology, ⁴National Taiwan University Hospital, ⁵Taipei Medical University, ⁶Shanghai Jiao Tong University School of Medicine

Introduction: Bed-sharing has been found to promote parent-child bonding and attachment, but it is also linked to more sleep problems in children. However, most studies have only examined bed-sharing in infancy and early childhood. Little is known about the potential benefits or consequences of bed-sharing for school-age children, with even fewer studies using actigraphy to objectively assess the impact of bed-sharing on both child and parent sleep.

Methods: A total of 246 school-age children aged 6-9 years with overweight or obesity were recruited from 10 public elementary schools in Taipei, Taiwan. Children's sleep was assessed objectively using actigraphy for one week and subjectively using the parent-reported Children's Sleep Habits Questionnaire. Parents completed the Pittsburgh Sleep Quality Index to assess their own sleep, as well as questions about sleep arrangements and family and child characteristics.

Results: Parent-child bed-sharing was reported by 42.6% of families. Bed-sharing was associated with higher reported child sleep disturbance scores ($b = 5.49$; 95% CI: 3.86 to 7.12; $p < .01$), but not with child actigraphic sleep profiles (all $p > .05$). No statistically significant differences in parental sleep were found according to bed-sharing, although parents reported poor sleep regardless of child sleep arrangements.

Conclusion: Parent-child bed-sharing is prevalent among Taiwanese school-age children with overweight and obesity and is related to more reported child sleep disturbances, but not with objective child sleep and parental sleep quality. Healthcare professionals can support parents in making informed decisions about bed-sharing practices in middle childhood while addressing

concerns they may have about their child's sleep and their own sleep quality.

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0931

CAREGIVER STRESS MANAGEMENT, BEDSHARING PRACTICES AND SLEEP HEALTH: AN EXPLORATION AMONG SOCIOECONOMICALLY DISADVANTAGED FAMILIES

Lauren Covington¹, Benjamin Brewer², Nicholas Bendel¹, Shannon Mayberry³, Xiaopeng Ji¹, Freda Patterson³

¹University of Delaware, ²Virginia Tech, ³University of Delaware College of Health Sciences

Introduction: Bedsharing is common in the U.S., especially in toddlerhood. Few studies have examined bedsharing in socioeconomically disadvantaged families, where structural stressors such as housing instability or overcrowding may increase its likelihood. Although bedsharing has been linked to poor maternal and infant sleep, evidence in toddlerhood is limited. This study examined associations between (1) caregiver stress and bedsharing and (2) bedsharing and caregiver/toddler sleep health in socioeconomically disadvantaged households.

Methods: We enrolled 60 caregiver-toddler dyads eligible for federally funded programs (e.g., WIC, Medicaid). Using a micro-longitudinal design, caregivers and toddlers wore 24/7 actigraphy for two weeks to measure sleep duration, efficiency, and timing. Caregivers also completed daily electronic diaries reporting stressors (severity, management strategies, perceived effectiveness) and toddler sleep location. Generalized Linear Models using GEEs assessed associations between caregiver stress, toddler sleep location, and dyadic sleep, adjusting for demographics.

Results: Caregivers (90% mothers; 48% Black; 83% <\$75k annual income) slept an average of 417.12 minutes/night (SD=76.88), with 83% sleep efficiency (SD=5.64) and an 11:15pm bedtime. Toddlers (57% male; mean age 2.36 years, SD=1.01) slept an average of 537.68 minutes/night (SD=87.47), with 88% sleep efficiency (SD=6.7), a 10:20pm bedtime, and 42% bedshared. One-quarter of caregivers reported family/parenting issues as their primary stressor, and 25% reported moderate-to-high daily stress. Up to 90% used healthy stress-management strategies (e.g., mindfulness, distraction), though 44% found them ineffective. Higher-income families (>\$75k) were less likely to bedshare (OR=-2.47, p=0.003) compared to lower-income, and toddler males were more likely to bedshare (OR=2.40, p=0.003) compared to females. Experiencing mild, moderate, or high stress was associated with greater odds of bedsharing (OR=0.6-0.9, all p< 0.05) compared with no stress. Stress-management effectiveness was not associated with bedsharing. Nightly bedsharing was also not associated with caregiver or toddler sleep outcomes.

Conclusion: Caregiver stress was associated with increased odds of bedsharing, regardless of how effectively caregivers managed their stress. Bedsharing was not linked to caregiver or toddler sleep health. Future work should explore caregivers' motivations

for bedsharing in toddlerhood and contextual contributors such as limited living space and housing instability.

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0932

WHEN BED SHARING BECOMES THE ONLY WAY: UNDERSTANDING BLACK MOTHERS' LIVED REALITIES OF SLEEP IN DELAWARE

Lauren Covington¹, Erica Allen², Benay Johnson³, April Lyons-Alls⁴, Michelle Drew⁵, Melissa Minor-Brown⁶, Bree Nehru⁷, Shannon Mayberry⁷, Emily Hauenstein⁸

¹University of Delaware, ²Do Care Doula Foundation, Inc., ³Beebe Healthcare, ⁴ALLY Community Health Associates, ⁵Ubuntu Black Family Wellness Collective, ⁶University of Delaware School of Nursing, ⁷University of Delaware College of Health Sciences, ⁸University of Virginia School of Nursing

Introduction: Unsafe sleep environments are the leading cause of death for U.S. infants between one month and one year of age. In Delaware, approximately one infant dies every month due to unsafe sleep conditions, with Black infants making up to 63% of unsafe sleep deaths. Black mothers' choices around their baby's sleep are often stigmatized and dismissed. Therefore, this study aimed to understand Black mothers' experience and decisions around getting their baby to fall and stay asleep in Delaware.

Methods: We conducted focus groups with Black mothers of infants and toddlers across Delaware counties (New Castle N=6, Dover N=7, Sussex N=7). Mothers were asked about what sleep strategies they used to get their baby to fall and stay asleep, what additional support they have or need, how their own childhood sleep experiences inform their approach to infant sleep, and what social messaging affects their decisions about their baby's sleep? We used qualitative content analysis to analyze the focus group data.

Results: Mothers were mean age (28.79 years, SD=5.23), 53% were single/never married, 32% held a Bachelor's degree or higher, 74% were enrolled in government-funded assistance programs, and 90% were breastfeeding or had breastfed in the past. Every mother stated that despite knowing national safe sleep guidelines, they chose to bedshare with their infant since birth, and none had divulged this information to their pediatrician. All mothers indicated that their decision to bedshare was accompanied by an emotional reaction including fear, guilt and shame. Mothers did not report bedsharing as a cultural practice, but as the only strategy that facilitated baby sleep, frequently in conjunction with breastfeeding. Mothers discussed having limited support and hesitancy to rely on their village, often in the context of their own chaotic childhoods.

Conclusion: Black mothers are choosing to bedshare with their infants, despite facing judgment from family, providers and partners. Mothers viewed bed sharing and breastfeeding (often in combination) as the only successful strategy in getting their baby to sleep. Future work must empower Black mothers to make informed decisions around their baby's sleep.

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0933

ASTHMA AND SLEEP-RELATED ENVIRONMENTAL FACTORS CONTRIBUTING TO SLEEP AWAKENINGS IN URBAN CHILDREN WITH ASTHMA

Mehtap Haktanir Abul¹, Sheryl Kopel², Shira Dunsiger³, Carly Mattice⁴, Virgelica Cabral⁴, Emily Jelfs⁴, Sidney Kirchhof⁵, Caroline Gredvig-Ardito⁶, Mary Carskadon⁵, Daphne Koinis-Mitchell²

¹Beth Israel Deaconess Medical Center, ²Rhode Island Hospital, ³Brown University School of Public Health, ⁴Bradley-Hasbro Research Center, Rhode Island Hospital, Brown University Health, ⁵E.P. Bradley Hospital Sleep Research Laboratory and COBRE Center on Sleep and Circadian Rhythms in Child and Adolescent Mental Health, Brown University Health, ⁶E.P. Bradley Hospital Sleep Research Laboratory

Introduction: Urban children with asthma encounter multiple asthma- and sleep-related environmental risks that can hinder asthma management and sleep. This study aimed to 1) describe the proportion of children exposed to asthma and sleep-related environmental factors that may challenge sleep and asthma outcomes, and 2) examine the association between night awakenings and asthma control using objective methods, including the role of asthma- and sleep-related environmental indicators in this association.

Methods: 150 urban children 7-9 years old with persistent asthma and their caregivers completed a 16-day observational protocol. Asthma control was assessed via the Asthma Control Test. Asthma and sleep outcomes were evaluated via self/caregiver report and objective (portable handheld spirometer, actigraphy) methods. Assessment of the asthma and sleep environment was also completed.

Results: Pets in the home were significantly associated with asthma control, and sharing a sleep surface was significantly associated with more sleep awakenings ($p < 0.05$). A higher proportion of children faced one asthma risk factor, whereas most children experienced four sleep environmental risks. Many participants also experienced 1-2 sleep hygiene challenges. The number of environmental exposures was similar between children with high versus low numbers of awakenings, and there were no significant associations between the total or indicator-specific number of exposures and asthma control or sleep awakenings.

Conclusion: Urban children experience multiple asthma- and sleep-related risks in their sleep environments, along with difficulties maintaining consistent sleep behaviors that support sleep onset and continuity. Although the quantity of exposures did not predict asthma control or awakenings in this sample, the type or quality of specific exposures may be more critical, particularly given heterogeneity in asthma and sleep vulnerability. Tailored, individualized approaches to asthma management, environmental control, and sleep hygiene may be necessary to improve both asthma and sleep outcomes for urban children with asthma.

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0935

DISENTANGLING SLEEP AND ECOLOGY: CORRELATES OF RISK FOR SOCIAL-EMOTIONAL PROBLEMS IN MEXICAN AMERICAN TODDLERS

Darcy Thompson¹, Matthew Daley², Melissa Fineman³, Ariel Williamson⁴, Suzanna Martinez⁵, Lisa Meltzer⁶

¹University of Colorado Anschutz Medical Campus, ²Institute for Health Research, Kaiser Permanente Colorado, ³University of Colorado School of Medicine, ⁴The Ballmer Institute for Children's Behavioral Health, University of Oregon, ⁵University of California, San Francisco, ⁶National Jewish Health

Introduction: Parent-reported sleep (bedtime, sleep duration, night wakings, problems) has been associated with toddler social-emotional problems. However, most studies have relied on a single reporter for both child sleep and social-emotional problems in predominantly middle-class, non-Latino White families. Therefore, this study included both objective and subjective assessments of toddler sleep, along with parent generational status and mood, when examining correlates of risk for social-emotional problems among Mexican American toddlers.

Methods: 238 mothers (18-45 years; mean education 12.4+2.8 years; 60% first generation) of Mexican American toddlers (56% boys; 12-16 months) completed the following surveys (53% in Spanish): Brief Infant Sleep Questionnaire (BISQ), the Brief Infant-Toddler Social and Emotional Assessment (BITSEA), and the PROMIS Depression short-form. Toddlers wore an actigraph for 7 nights to measure nighttime sleep. Logistic regression examined BITSEA risk for social-emotional problems based on validated clinical cutoffs, and included actigraphy and parent-reported sleep variables that were correlated with the social-emotional problem total score. We controlled for demographic (child age and sex, parent age and education [years]) and contextual (generational status [first generation born in Mexico], PROMIS Depression T-score) factors.

Results: Neither actigraphic nor parent-reported sleep variables were significantly associated with risk for social-emotional problems (all $ps > .15$). In contrast, each 1-point increase in parent age was associated with an 11% increase in the odds of toddler risk for social-emotional problems ($OR=1.11$, $p<.001$) and each additional year of parent education was associated with a 30% increase in the odds of toddler risk for social-emotional problems ($OR=1.30$, $p<.001$). Finally, each 1-point increase in parent depressive symptoms T-score was associated with a 6% decrease in the odds of toddler risk for social-emotional problems ($OR=0.94$; $p=.006$).

Conclusion: Contrary to previous studies, objectively and subjectively measured toddler sleep were not associated with risk for social-emotional problems in this sample of Mexican American toddlers when controlling for demographic and contextual factors. The demographic findings, although counterintuitive, may reflect heightened awareness or reporting of social-emotional problems among older, more educated caregivers. While sleep remains essential for child development, it must be considered within the context of family ecology when considering the risk of early social-emotional problems in community-based samples.

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0936

DO DEMANDING SCHEDULES EXPLAIN POOR SLEEP IN ELITE ADOLESCENT ATHLETES? INSIGHT INTO ACADEMIC AND TRAINING DEMANDS AND SLEEP

Flynn Crosbie¹, Damien Léger², Mathieu Nedelec¹

¹INSEP (French National Institute of Sport, Expertise and Performance), ²Paris Cité University, VIFASOM (Vigilance, Fatigue, Sleep and Public Health)

Introduction: Insufficient sleep is common in elite adolescent athletes, who must balance high training volumes with demanding school schedules. Yet how this cumulative schedule affects sleep throughout the different phases of an athletic schedule remains unclear. Our objective was to monitor athletes over an extended period, classify training and school demands, and examine their impact on sleep across the different phases.

Methods: Twenty-nine adolescent rugby players (16.4 ± 0.7 years) from a high-performance center were monitored continuously for 2.5 months. Data collection covered four real-life phases of the athletic schedule: post-holiday return to school/training, regular school/training schedule, training camp, and holidays. Sleep was assessed daily using actigraphy. School and training timetables were quantified by categorizing all activities into 30-min time slots between 08:00 and 22:00, as rest, on-field (training, matches) or off-field (school, meetings).

Results: School days showed the highest activity load (380.8 ± 103.6 min), combining large off-field time (279.5 ± 104.2 min) and training time (101.3 ± 75.6 min). They also started earliest ($08:29 \pm 01:12$) and finished latest ($17:48 \pm 02:15$), leaving the least room for sleep, with a total sleep time (TST) of only $7h02 \pm 01h03$. The longest sleep was observed on the night before competition (Friday–Saturday): bedtime shifted slightly later ($00:01$ vs $23:31$), but wake time shifted dramatically ($09:26$ vs $07:13$), resulting in $8h37 (\pm 01h12)$ of sleep. Even without next-day constraints, rest nights (Saturday / Holidays) TST only reached $8h14 (\pm 01h12)$ and $8h07 (\pm 01h13)$. Wake times were later ($09:50$ and $10:10$), but bedtimes were also delayed ($00:47$ and $01:16$), limiting recovery.

Conclusion: Elite adolescent athletes consistently slept below the recommended 8–10 hours during the week, when dense schedules left little room for sleep. Surprisingly, rest days did not produce a meaningful increase, with sleep barely exceeding 8 hours. In practice, when next-day constraints disappear, athletes simply delay bedtime, limiting the benefit that weekends could provide. This suggests that insufficient sleep is not only driven by high

athletic and academic demands, but also by behaviour. One likely contributor is the growing use of screens in the evening, which may partly account for the delayed bedtime.

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0937

ENHANCING NASAL PRESSURE SIGNAL INTEGRITY IN PEDIATRIC POLYSOMNOGRAPHY: OUTCOMES OF THE DREAM-Q QUALITY IMPROVEMENT INITIATIVE

Lawrence Gersz, Michelle Yoo, Michelle DiMaria, Brian Schultz, Ngoon-Yin Lee, Edward Matthews, Erika Murchison, Yolanda Yu, Jennifer Falvo, Suzanne Beck
Children's Hospital of Philadelphia

Introduction: Nasal pressure airflow (NPAF), an integral signal in pediatric polysomnography, is the gold standard to identify hypopneas during a polysomnogram (PSG). Acquiring reliable NPAF signals requires technical skill for accurate PSG interpretation. At our center, prior to intervention, only 48% of studies had optimal NPAF signals. Our lab developed a unique approach for Data Reliability Enhancement and Analysis in Monitoring Quality, "DREAM-Q," with goal to increase the percentage of PSGs with optimal NPAF signals to 75% by June 30, 2026, regardless of technologist's level of experience.

Methods: A DREAM-Q survey was developed in REDCap and completed by daytime scorer after scoring each PSG, without stratification of clinical context, age, patient complexity or other factors. DREAM-Q included assessment of 1) accuracy of overnight technician documentation, 2) quality of 11 signals on a 4-point objective scale (1=poor, 2=fair, 3=good, 4=excellent), 3) appropriate troubleshooting of signals and 4) description of troubleshooting efforts. After analysis of baseline data, the initial intervention included creation and distribution of two job aids detailing goals of the project in video format and a troubleshooting document. A subsequent intervention included a policy change that night technologists include documentation of NPAF signal integrity every 30 minutes (e.g. cannula position, patency, quality, troubleshooting, patient tolerance, and respiratory status). DREAM-Q results were reviewed with our scoring team and shared weekly with night technicians in the form of an SPC chart as an ongoing motivator to continue progress.

Results: Collection of baseline data ramped up over 5-months (5/20/25–10/26/25) with scorer sampling rate improving from 31% to 75% ($n=1,387$ PSGs sampled). DREAM-Q surveys demonstrated 48% with optimal NPAF quality (score 4). Following implementation of initial intervention on 10/26/25, data through 11/22/25 showed an improvement in optimal NPAF quality to 55% ($n=345$ PSGs).

Conclusion: DREAM-Q is a unique, useful method for data reliability enhancement and analysis in monitoring quality of acquisition signals during pediatric PSG. Our ongoing quality improvement initiative has demonstrated that targeted strategies of education, feedback, and focused support for overnight technicians resulted in improvement in NPAF quality. We plan to continue improvement cycles to further optimize signal quality with potential expansion to other polysomnogram signals.

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0938

EXCESSIVE DAYTIME SLEEPINESS AND ITS RELATIONSHIP TO SLEEP DISORDERS IN PEDIATRIC PATIENTS WITH ASTHMA USING PSG DATA

Zachary Pottanat¹, Melissa Cole², Aisaku Nakamura²,
Md Monir Hossain², Narong Simakajornboon²

¹Cincinnati Children's Hospital Medical Center/University of Cincinnati, ²Cincinnati Children's Hospital Medical Center

Introduction: Excessive daytime sleepiness (EDS) is a common complaint in children with asthma. Several factors can contribute to EDS in asthmatic patients, including disrupted sleep from asthma, medications, and sleep disorders. Previous studies have shown complex relationships between asthma and OSA. However, there is limited information on other sleep disorders. Therefore, we aimed to assess underlying sleep disorders in pediatric asthma patients with EDS.

Methods: A retrospective study was performed in asthma patients aged 0-18 years old with EDS (ESS >10) who had PSG/MSLT at CCHMC. We calculated the percentage of OSA (oAHI > 1.5/hr), CSA (central apnea index > 5/hr), hypoventilation, PLMD (PLM index > 5/hr), narcolepsy, and idiopathic hypersomnia (IH) for the whole population. For those with narcolepsy and IH, the percentage was calculated based on patients who underwent MSLT. In addition, comparison of percentage for each sleep diagnosis between children (< 12 yo) and adolescents (> 12 yo) was done by Chi-square or Fisher's exact tests.

Results: 629 patients met the criteria for analysis. The mean age was 8.82±5.28 years, 59.3% male, 476 children, and 153 adolescents. There were no significant differences in the proportion of race and sex between children and adolescents. For the whole population, 53.6% were diagnosed with OSA, 3.6% with CSA, 4.29% with sleep-related hypoventilation, 19.7% with PLMD, 16.67% with narcolepsy, and 19.44% with IH. Comparison between children [C] and adolescent [A] demonstrated significant higher percentage of OSA (50.3% [C] vs 63.8% [A]; $P < 0.05$) and lower percentage of CSA (4.96% [C] vs 0% [A]; $P < 0.05$) in adolescents. There was a trend toward higher percentage of narcolepsy in adolescents ($P = 0.06$). There were no significant differences in the percentage of hypoventilation, PLMD, or IH between children and adolescents.

Conclusion: Among pediatric asthma patients presenting with EDS, several sleep disorders were identified, with OSA being the most frequent diagnosis, followed by PLMD. Children and adolescents with asthma exhibited distinct profiles of sleep pathology with a higher prevalence of OSA in adolescents, but a higher prevalence of CSA in children. Interestingly, higher percentage of narcolepsy was identified in adolescents. These findings highlight the need for age-specific clinical screening strategies and support the role of PSG in evaluating asthmatic children with EDS.

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0939

IMMIGRANT GENERATION STATUS AND ITS ASSOCIATIONS WITH OBJECTIVE INFANT SLEEP AND MATERNAL SLEEP QUALITY

Shambhavi Thakur¹, Carmela Alcantara², Sarah Berger³,
Monica Ordway⁴, Natalie Barnett⁵, Maristella Lucchini⁵

¹Nanit, ²Columbia University School of Social Work, ³City University of New York, ⁴Yale University, ⁵Nanit Lab

Introduction: Prior research has documented sleep health disparities across immigrant groups. However, less is known about how these differences occur in mother-infant dyads. This study examined whether immigrant generational status is associated with infants' objectively measured sleep and mothers' self-report sleep, providing an intergenerational view of sleep health within immigrant families.

Methods: Participants were 1,274 mothers of infants aged 0-24 (10.07±6.8) months residing in the US. First-generation mothers were not born in the US ($n=134$), second-generation were born in the US with at least one parent born outside the US ($n=183$). Non-immigrant mothers ($n=957$) were born in the US to US-born parents. 72% were White, 10% multiracial, 6% Asian, 7% Hispanic/Latino and 3% Black, and >55% earning ≥\$150,000/year. Infant sleep was measured using Nanit autovideosomnography, including sleep duration, night wakings, and parent nighttime crib visits. Parental sleep was assessed using the PSQI. Generational differences in infant sleep were examined with linear regressions, while in parental sleep were examined using ANCOVAs. Child age was a covariate.

Results: Second-generation mothers reported poorer overall PSQI score compared to non-immigrant mothers ($\beta = -1.124, SE = 0.323, p = 0.002$), while first-generation mothers did not differ from either group. Second-generation mothers reported poorer subjective sleep quality ($\beta = -0.190, SE = 0.067, p = 0.014$) than non-immigrant mothers. First-generation mothers showed longer sleep latency than non-immigrant ($\beta = 0.293, SE = 0.102, p = 0.011$) and second-generation mothers ($\beta = -0.465, SE = 0.129, p < 0.001$). Both first ($\beta = -0.326, SE = 0.084, p < 0.001$) and second-generation mothers ($\beta = -0.229, SE = 0.077, p = 0.008$) slept less than non-immigrant mothers. Infants of first-generation mothers slept 27 minutes less ($p = 0.007$), woke 0.52 more times per night ($p = 0.034$), and experienced 1.5 more parental nighttime visits ($p < 0.001$) than infants of non-immigrant mothers. Infants of second-generation mothers did not differ from non-immigrant families.

Conclusion: Immigrant mothers showed poorer sleep than non-immigrant mothers. Similarly, babies born to first-generation mothers had shorter and more fragmented sleep than those of non-immigrant mothers, while infants of second-generation mothers did not differ from non-immigrant infants. Given sleep's critical role in lifelong health, the parallel sleep disadvantages in immigrant mothers and their children point to a potential intergenerational transmission of vulnerability within immigrant communities.

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0940

IMPLEMENTATION OF THE BEARS SCREENING TOOL WITHIN THE PEDIATRIC RESIDENT CONTINUITY CLINIC SETTING IN IMPROVING REFERRALS TO PEDIATRIC SLEEP MEDICINE

Dhanya Narayana Panicker, Ramon Cuevas
St. Luke's University Health Network

Introduction: The prevalence of parent-defined sleep problems in various sleep domains ranges from 9.3 to 45.6%, with 67.9% of

children having significant problems in at least one sleep domain. The most common problems reported were bedtime resistance and parasomnias. Despite this high prevalence of pediatric sleep problems observed within the primary care, rates of screening and referrals to sleep medicine are low. Our aim was to implement a simple 5-item pediatric sleep screening instrument—the BEARS sleep screening tool—within a pediatric resident continuity clinic setting and seeing if this assists in both the increased detection of sleep disorders, and in appropriate referral to the Pediatric Sleep Medicine clinic.

Methods: Pre and Post intervention QI initiative utilizing a PDSA cycle over 5 months, among a convenience sample of 2–18-year-old well child visits. Pre/post intervention data collected by individual chart review in assessing documented sleep concerns, therapeutic interventions and Sleep Medicine Clinic referrals. BEARS forms were administered during post-intervention period.

Results: During the pre-intervention period, 231 patients were seen (mean age 9.25 years, median 9 years; 49.8% female, 50.2% male), with the majority identifying as Hispanic/Latino (63.2%), followed by Puerto Rican (13.9%), African American (1.7%), and others (20.3%). No screening tools were used, and only few sleep concerns were identified. After introducing the BEARS tool, 25 patients who have completed the screening tool were identified (mean age 8.52 years, median 6 years; 48% female, 52% male), with ethnicity distributed as Hispanic/Latino (36%), Puerto Rican (16%), African American (12%), White/Caucasian (16%), and others (20%). Within this sample, sleep-related issues were identified in 56% of patients. This was associated with an increase in both, referrals to sleep medicine, 5.6% to 20%, and in scheduled sleep studies, from 0.9% to 8%.

Conclusion: This is an ongoing QI project, with observed results to-date being limited due to small sample size. Nevertheless, these findings demonstrate that integrating the BEARS tool may greatly increase screening for sleep disorders, referrals to Sleep Medicine clinic, and institution of appropriate treatments, for pediatric patients across various demographic groups.

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0941

IMPROVING SAFE SLEEP SCREENING AND COUNSELING IN A PEDIATRIC SLEEP MEDICINE CLINIC

Swati Jayaram¹, Jamie Booker², Lauren Girona², Steven Holfinger³, Maninder Kalra²

¹Nationwide Children's Hospital, The Ohio State University,

²Nationwide Children's Hospital, ³The Ohio State University

Introduction: Sudden unexpected infant death is a leading cause of mortality in U.S. infants < 12 months and is often linked to modifiable sleep-related factors. Although the AAP recommends the “ABCs of Safe Sleep” (Alone, on the Back, in a Crib), safe-sleep screening is often overlooked in subspecialty clinics caring for medically complex infants. In the Sleep Medicine Clinic at Nationwide Children's Hospital, review of visits for infants < 1 year (Jan to Aug 2025) showed that only 37% of encounters documented screening for at least one ABC component, none documented all ABCs, and counseling was recorded in just 9% of visits. Our aim is to increase both documented safe-sleep screening and counseling to ≥60% of eligible visits by March 2026 and sustain this for 6 months.

Methods: Using the Model for Improvement, we implemented a bundled intervention: (1) standardized screening via EMR Smart Phrase for infants < 12 months and medical assistants and nurses screening for safe sleep embedded directly into Epic workflows at check-in (2) provider education/micro-teaching on safe sleep and workflow expectations; (3) standardized education and documentation of counseling, including discharge instructions and providing Helping Hands for Safe Sleep, (4) planned EMR optimization to auto print Safe sleep instructions for patients eligible and lastly (5) weekly reminders for providers with visits for infants < 12 months. We compared pre-intervention clinic encounters for infants < 12 months (Jan 1 to Aug 31, 2025) with a 2-month post-intervention period Sept 15 to Nov 15, 2025. Percent of standardized discharge instructions utilization was tracked alongside the primary outcomes 1) percent of eligible visits with completed safe-sleep screening and 2) percent with documented counseling.

Results: Data reviewed from Sept 15 to Nov 15th, 2025, showed an increase in safe-sleep screening from 37% (baseline Jan to Aug 2025) to 69%. Documentation of counseling increased from 9% to 69%, and standardized discharge instructions were used in 100% of eligible encounters.

Conclusion: A low-cost, EMR-embedded, workflow-aligned bundle can measurably increase safe-sleep screening and documented counseling in a pediatric sleep clinic and supports alignment with AAP recommendations. This approach is feasible and adaptable to other pediatric subspecialty settings.

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0942

INFANT SLEEP AND PARENT WORK OUTCOMES

Cristiano Guarana¹, Christopher Barnes², Michael Nugent¹, Asiya Bari²

¹Indiana University, ²University of Washington

Introduction: Family-to-work conflict research has largely emphasized waking caregiving demands, overlooking how overnight disruptions—particularly infant sleep—shape parents' functioning at work. Drawing from family-to-work conflict theory and organizational sleep research, we theorized that infant sleep represents a consequential overnight parental demand that influences parents' sleep and subsequent work engagement and task performance. We further proposed that parental cognitions—specifically, beliefs about responding to infant night wakings—serve as a boundary condition that shapes these effects.

Methods: We conducted a preregistered, five-week within-person field study of 125 full-time working parents of infants. Infant sleep duration and quality were objectively assessed using auto-videosomnography, and parents completed twice-weekly morning and evening surveys measuring their sleep duration and quality, work engagement, and task performance. Beliefs about responding to infant night wakings were measured at baseline. Multilevel models tested direct, indirect, and moderated mediation effects.

Results: Infant sleep duration significantly predicted parent sleep duration ($\gamma=.28$, $p<.01$) and sleep quality ($\gamma=.18$, $p<.01$). Infant sleep quality predicted parent sleep quality ($\gamma=-.029$, $p=.028$) but not parent sleep duration ($\gamma=.015$, $p=.264$). Parent sleep duration mediated the effects of infant sleep duration on work engagement (indirect effect=.11, 95% CI [.053, .165]) and task

performance (indirect effect=.11, 95% CI [.061, .170]). Indirect effects via parent sleep quality were nonsignificant. Parental response beliefs moderated these pathways: the indirect effects of infant sleep duration through parent sleep duration were stronger for parents higher (work engagement: .165, 95% CI [.082, .243]; task performance: .161, 95% CI [.083, .243]) versus lower in these beliefs (work engagement: .080, 95% CI [.030, .129]; task performance: .079, 95% CI [.025, .131]), with significant differences (Δ =.084 and .083, respectively).

Conclusion: Infant sleep is a significant and overlooked source of family-to-work conflict. Daily fluctuations in infant sleep duration undermine parent sleep—and subsequently work engagement and task performance—especially for parents who strongly believe they must respond to night wakings. These findings broaden theoretical understandings of parental demands and identify opportunities for organizations to support employees navigating infant sleep challenges.

Support (if any):

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0943

IRON DEFICIENCY AND ITS ASSOCIATION WITH POOR SLEEP IN CHILDREN WITH CYSTIC FIBROSIS

Aarti Shakkottai

UT Southwestern Medical Center

Introduction: Iron deficiency (ID) is common among children and adults with cystic fibrosis (CF) and appears to persist even after the use of highly effective modulator therapy (HEMT). There is an association between ID and restless sleep and frequent limb movements during sleep in children. However, little data exists on whether these same associations are present in children with CF.

Methods: Single-center retrospective review of medical records and polysomnographic data in children with CF between 2012-2025 to identify the prevalence of ID and its association with sleep complaints and disordered sleep.

Results: Polysomnographic data was available for 54 children with CF. Thirty-six were on HEMT for an average of 2.2 ± 1.6 years prior to polysomnography. Children on HEMT were older (10.1 vs 6.1 years, respectively; $p=0.001$) and had better lung function (98.4 vs 88.2%, respectively; $p=0.02$) as compared to those not on HEMT. Nutritional status was normal, on average, and similar between the groups ($p=0.3$). Iron deficiency (ferritin < 30 ng/mL) was present in 73% of children with 20% also having anemia (low hemoglobin level). Low iron stores (ferritin < 50 ng/mL) were noted in 92% of children. Prevalence of ID did not differ by sex, nutritional status, lung function, or HEMT status. Sleep complaints were common (snoring: 72%, restless sleep: 68%, insomnia: 49%, hypersomnolence 34%); 57% had obstructive sleep apnea (OSA) and 9% had frequent limb movements during sleep (PLMS). Children on HEMT had 4.0 times greater odds of OSA (95%CI:1.3-12.2; $p=0.02$) and 3.0 times greater odds of Insomnia (95%CI:0.9-9.8; $p=0.06$) as compared to those not on HEMT. Four of the five children with PLMS were on HEMT. ID was associated with restless sleep (OR=5.5; 95%CI: 1.1-28.2; $p=0.04$). ID was also present in 10/11 children (91%) with hypersomnolence ($p=0.1$) and 16/19

children (84%) with insomnia ($p=0.09$). All 3 children with PLMS who had iron studies were noted to have ID.

Conclusion: ID is common among children with CF, even in the post-HEMT era and appears to be associated with poor sleep. Prospective screening for ID is needed in all children with CF. Larger studies are needed to understand the etiology behind this deficiency.

Support (if any):

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0944

LOWER SLEEP SPINDLE DENSITY AND EVENING CHRONOTYPE ARE ASSOCIATED WITH INCREASED DAYTIME SLEEPINESS IN ADOLESCENTS

Reut Gruber¹, Sujata Saha², Gail Somerville³, Rosalie Barbeau³, Merrill Wise⁴

¹McGill University, ²Heritage Regional High School, ³Attention, Behavior & Sleep Lab Douglas Mental Health University Institute,

⁴Mid-South Pulmonary and Sleep Specialists, PC

Introduction: Insufficient sleep and daytime sleepiness are widespread among adolescents, contributing to academic difficulties, mood disturbances, and safety risks. Beyond total sleep duration, neurophysiological and circadian factors may play a critical role. The objective of the present study was to simultaneously examine the relative contributions of key sleep parameters (duration, neurophysiology, and chronotype) that are known to change during adolescence to daytime sleepiness, under typical school-week conditions in adolescents' natural environments

Methods: Forty-five healthy adolescents (27 girls, 18 boys; mean age = 13.9 SD= 0.95) were included. Participants completed multi-night actigraphy, daily electronic sleep logs, and a single overnight in-home electroencephalography (EEG) recording using a multi-channel frontopolar EEG device (Sleep Profiler). Daytime sleepiness was assessed using the Epworth Sleepiness Scale for Children and Adolescents (ESS-CHAD). Actigraphic data were scored using Actiware software; Raw EEG signals were visually analyzed and scored using standardized AASM scoring criteria. Demographic information, including pubertal status and gender, was collected via a detailed background questionnaire.

Results: Regression analyses, adjusted for age and sex, were performed to identify unique correlates of daytime sleepiness. The findings revealed that lower sleep spindle density and a stronger evening circadian preference were the only significant variables associated with daytime sleepiness. These two factors together were strongly associated with sleepiness, explaining 45.3% of the variance in subjective daytime sleepiness.

Conclusion: Adolescent daytime sleepiness is strongly associated with neurophysiological (sleep spindle density) and circadian (chronotype) factors, suggesting that sleep duration alone is insufficient to explain sleepiness in this population. Interventions aimed at improving sleep health in adolescents should consider targeting both sleep microstructure and chronotype

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0945

PARENT SLEEP AT 5-6 MONTHS POSTPARTUM AND MOMENT-BY-MOMENT RESPONSES TO INFANT CUES DURING PLAY: A PRELIMINARY ANALYSISGina Mason¹, Aashritha Sadu², Grace Kupka², Kiara Medeiros², Katherine Mitchell², Katherine Sharkey³, Jared Saletin¹¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²E.P. Bradley Hospital Sleep Research Laboratory, ³Wake-Forest University School of Medicine, Atrium Health, Advocate Health

Introduction: Postpartum sleep disturbances are associated with disrupted parenting. While prior studies have linked parent sleep to parenting behavior using composite ratings during parent-infant play, such assessments lack fine-grained information on potentially modifiable behaviors that may be impacted by poor sleep. In contrast, micro-level dyadic analyses quantify the contingency (timing) and content (focus) of parents' moment-by-moment responses, which directly predict infant outcomes. The present ongoing study examines relations between parent sleep and these micro-level aspects of dyadic parenting behavior.

Methods: Seven female parents (age=34.6±3.6 years) and the 5-6-month-old infants they gave birth to (age=6.2±0.5 months; 1F) completed a 15-minute video-recorded free-play session following 5-8 nights of actigraph-monitored sleep at home. Researchers scored 6 minutes (5-7, 9-11, and 13-15) of each session offline, coding infants' visual attention and non-cry vocalizations and parents' verbal/manual behaviors. Parent contingency was calculated as the percentage of infant vocalizations receiving a parent response within 2sec of offset. Parent response content was quantified as the percentage of contingent responses that were jointly focused (i.e., engaged infants' object of attention). Actigraph-estimated parent sleep variables included mean total sleep time, efficiency (total sleep time/sleep period time [%]), and fragmentation (#wakeups/100-minutes sleep). Partial correlations and regressions controlling for infants' number of vocalizations (mean=30±23, range 7-63) assessed the relations between each sleep variable and parents' contingency and response content.

Results: Parents' mean sleep efficiency ranged from 74.9%-97.0% (mean=86.2%±6.6%), with 42.9% of parents sleeping a mean of < 7h/night. Based on 6 dyads with scorable video, parent contingency ranged from 25.6%-85.7% (mean=50.4%±25.7%), and 28.2%±19.6% of parents' responses were jointly focused (range=0%-54.6%). Critically, parents with higher sleep efficiency exhibited significantly more jointly-focused responses ($r=.987$, $p=.002$). No other linear relations were significant (all $p>.05$), though sleep efficiency also showed a nonlinear relation with parents' overall contingency levels that must be further explored (β quadratic-standardized=8.76, $t=8.29$, $p=.014$).

Conclusion: In this preliminary sample, sleep was associated with the content of micro-level parental responses during free-play: parents with higher sleep efficiency had more jointly-focused contingent responses. Data collection is ongoing. Future analyses will assess how concordance between parents' and infants' sleep patterns may relate to parent dyadic behavior.

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0946

PSYCHOSOCIAL FACTORS CONTRIBUTING TO ASTHMA AND SLEEP IN URBAN CHILDRENLinda Guzman¹, Sheryl Kopel¹, Shira Dunsiger², Virgelica Cabral¹, Emily Jelfs¹, Caroline Gredvig-Ardito³, Mary Carskadon⁴, Daphne Koinis-Mitchell¹¹Rhode Island Hospital, ²Brown University School of Public Health, ³E.P. Bradley Hospital Sleep Research Laboratory, ⁴Psychiatry and Human Behavior, Alpert Medical School of Brown University

Introduction: Children with persistent asthma in urban environments experience psychosocial stressors that affect asthma management and sleep. Although daily links between lung function and sleep are established, less is known about how specific psychosocial factors contribute to these associations. This study examined whether asthma- and/or sleep-related fear, family stress, acculturative stress, financial strain, and neighborhood safety contributed to the relation between asthma and sleep.

Methods: Data are from a larger study of asthma and sleep disparities in urban children (R01HL142058; full sample =240). Children ages 7-9 completed a 16-day protocol including daily use of spirometry (FEV₁% predicted) and actigraphy (sleep duration, efficiency, awakenings). Caregivers also completed the validated measures of asthma control (Asthma Control Questionnaire), asthma-related and sleep-related fear, family stress (Family Inventory of Life Events), parental acculturation (Cultural Stress Scale), and neighborhood safety (Neighborhood Safety Scale).

Results: Preliminary analyses aligned with our prior findings. In the entire sample, higher daily FEV₁ predicted longer sleep duration ($\beta = 0.48$, $p = .03$). Better asthma control was related to longer sleep ($\beta = -7.87$, $p = .02$). In models testing the moderating role of psychosocial variables in the entire sample, financial strain and neighborhood safety moderated the association between lung function and sleep duration. For families with higher financial strain, poorer lung function related to longer sleep. For families with low neighborhood safety, poorer asthma control related to shorter sleep. In models testing ethnic group differences, the moderating effect of financial strain on lung function and sleep duration was significant among Latinos ($\beta = -.67$, $p = .004$). Those reporting greater financial strain showed a weaker association between lung function and sleep duration than those reporting less strain. Similarly, among Latinos, neighborhood unsafety moderated the association between asthma control and sleep duration ($\beta = 21.28$, $p = .01$). Among those reporting more neighborhood unsafety, poorer control related to shorter sleep. Main effects will be reported for models.

Conclusion: Asthma status correlated with sleep outcomes, and psychosocial factors play a role in this association, suggesting consideration of urban stressors in multi-component interventions addressing asthma and sleep disparities.

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0947

SLEEP DISORDERS IN CHILDREN AND ADOLESCENT WITH EHLERS-DANLOS SYNDROME – A SINGLE CENTER COHORT STUDY

Ragan Howard¹, Ryan Riggs¹, Bakeerathan Gunaratnam¹, Egambaram Senthilvel²

¹University of Louisville, ²University of Louisville School of Medicine

Introduction: Children with Ehlers-Danlos Syndrome (EDS) are more prone to developing various sleep disorders. This study aimed to 1. Assess the prevalence of sleep disorders and 2. Characterize the polysomnographic difference in children with EDS compared to normal children.

Methods: This was a single-center retrospective study involving children with confirmed EDS who underwent overnight polysomnography (PSG). OSA severity was categorized by obstructive apnea-hypopnea index (OAH) as normal (< 1 event/h), mild (1–4.9 events/h), moderate (5–9.9 events/h), or severe (≥ 10 events/h).

Results: Data from 57 EDSs and 57 matched controls were analyzed. The gender, mean age, and median BMI of the EDS and control groups were 63.2% female, 13 years, and 21.1, versus 68.4% female, 12 years, and 23.5, respectively. For both groups, the majority were referred to sleep medicine by a general pediatrician. Snoring was the most common referral reason for the normal group ($p=0.029$), and insomnia ($p=0.029$) and sleep disturbances ($p=0.012$) were common reasons for the EDS group. The average number of visits to Sleep Medicine was 5.5 for the EDS group and 4.1 for the normal group. It was found that POTS ($p<0.0001$) and fibromyalgia ($p=0.001$) were significantly more associated with EDS than the normal group. Primary snoring and OSA were commonly diagnosed among both groups, with no statistical significance between them. Daytime sleepiness ($p=0.021$) and insomnia ($p=0.029$) were common in the EDS group. In the EDS group, 35.1% were diagnosed with mild OSA, 5.3% with moderate OSA, and 5.3% with severe OSA. In the normal group, 24.6% were diagnosed with mild OSA, 12.3% with moderate OSA, and 3.5% with severe OSA. Sleep architecture (total sleep time, sleep latency, wake after sleep (WASO), sleep efficacy, N1, N2, N3, REM sleep, and arousal index) showed no significant difference between groups. Respiratory parameters such as AHI, SaO₂ nadir, and maximum CO₂ also showed no significant difference.

Conclusion: While OSA was equally prevalent in both groups, daytime sleepiness and insomnia were highly prevalent in EDS. There were no significant differences noted in sleep architecture or respiratory parameters between the two groups.

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0948

SLEEP HEALTH AND DIFFICULTY CONCENTRATING AMONG US TEENS – DATA FROM THE NATIONAL SLEEP FOUNDATION SLEEP IN AMERICA® POLL

Serre Klijian¹, Suzanne Gorovoy², Joseph Dzierzewski³, Girardin Jean-Louis⁴, Alicia Chung⁵, Azizi Seixas⁴, Brittany Larsen⁴, Patricia Haynes¹, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Arizona College of Medicine, ³National Sleep Foundation, ⁴University of Miami, ⁵NYU School of Medicine

Introduction: Many young adults experience cognitive dysfunction like difficulty concentrating, which can affect academic performance, daily functioning, and emotional wellbeing. It is unclear which specific aspects of sleep are most strongly correlated with concentration problems. Prior studies have focused on total sleep duration, even though healthy sleep has a much wider range of experiences and behaviors.

Methods: Data were collected from the National Sleep Foundation Sleep In America Poll. The population-based sample included N=1,097 13–17-year-old adolescents who provided complete data. Difficulty concentrating was assessed based on survey items asking how often in the past 2 weeks respondents were bothered by “Trouble concentrating on things like schoolwork, reading, or watching TV.” Responses were categorized as None, Sometimes (less than half the days), or Often (more than half the days). Regression analyses adjusted for age, gender, race/ethnicity, and socioeconomic. Holm-Bonferroni correction was used, with a revised cutoff of $p<0.0005$.

Results: Weighted prevalence of difficulty concentrating was None (54.37%), Sometimes (34.31%), and Often (11.32%). Following Holm-Bonferroni correction, difficulty concentrating Often was associated with being somewhat (RRR=7.83) or very (RRR=17.92) dissatisfied with sleep, “not refreshed at all” (RRR=23.05), “not energized at all” (RRR=59.80), “a great deal” of difficulty falling asleep (RRR=8.27), frequent awakenings “very often” (RRR=30.64), “somewhat difficult” resuming sleep (RRR=4.48), very dissatisfied with weekday (RRR=12.06) and weekend (RRR=29.40) sleep duration, somewhat (RRR=6.06) and very (RRR=13.29) difficult relaxing, and fair (RRR=13.80) or poor (RRR=28.05) sleep quality. It was also associated with fewer days/week feeling well-rested ($B=-1.06$) and more days/week with difficulty falling asleep ($B=1.50$), difficulty staying asleep ($B=1.27$), and sleep impacting functioning ($B=1.42$). It was also associated with an increased likelihood of talking to a doctor about sleep ($OR=3.17$).

Conclusion: Difficulty concentrating and remaining focused were strongly linked to poor sleep health, low energy levels throughout the day, greater difficulty falling asleep or staying asleep, and overall dissatisfaction with sleep quality. Strategies to address teens’ daytime cognitive functioning should address multidimensional aspects of sleep health.

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0949

UNDERSTANDING THE HOW, WHO, AND WHEN OF SLEEP HEALTH COMMUNICATION AMONG BLACK ADOLESCENTS

Mattina Davenport¹, Ariana Calloway², Devante Barnes², Tracy Afriyie³, Marquis Hawkins⁴, Natalie Mitchell⁵

¹Nationwide Children’s Hospital, The Ohio State University, ²Nationwide Children’s Hospital, ³Miami University, ⁴University of Pittsburgh, ⁵The Ohio State University

Introduction: Black adolescents disproportionately experience insufficient and suboptimal sleep, yet little is known about how intergenerational and community communication shape their sleep experiences and sleep health literacy. This study examines

the how, who, and when of sleep health communication among a sample of Black adolescents and how these practices influence their sleep beliefs and experiences.

Methods: Using in-depth interviews, consented/assented participants ages 11-17 who self-identified as Black/African American were recruited in Columbus, Ohio, from the NCH Primary Care Network, Care Connection (School-Based Health Clinics), Adolescent Medicine Clinic, Science Education Outreach program, and the NCH Marketing/Public Relations Team. The interviews captured insights into participants' sleep environment, sleep beliefs, sleep habits, communication about sleep, and awareness/availability of sleep resources. Interviews were conducted over Zoom between May 2022 and May 2023, with recordings transcribed for formal thematic analysis using Microsoft Excel.

Results: The sample included N=21 US Black/African American adolescents who were $14 \pm .15$ of age on average. Half of the sample was female (n=11), and 90.9% of our sample reported they were not employed prior to the COVID-19 pandemic (n=20). Three main themes were identified from the results: 1) how sleep conversations occur (modality, settings); 2) who initiates sleep conversations (healthcare providers, family members, other adults); and 3) depth and scarcity of sleep dialogue (limited dialogue, non-existent dialogue, contextual drivers of dialogue). Study results illuminate a dearth of meaningful sleep conversations occurring across home and community settings, with adolescents commonly only having brief conversations about sleep with their pediatrician annually.

Conclusion: Addressing intergenerational sleep health conversations calls for multilevel health communication strategies to make sleep a routine topic within families and the broader community. Future efforts should focus on developing culturally grounded, scalable approaches to enhance sleep health communication and improve long-term health and well-being.

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0950

PERCEPTIONS ABOUT SLEEP AND TECHNOLOGY USE AMONG MIDDLE SCHOOL STUDENTS, STAFF AND CAREGIVERS

Talia Cordova¹, Andrea Perez², Xiaoqi Ma³, Alyssa Marquez³, Geselle Muñoz³, Jen Doty³, Ariel Williamson¹

¹The Ballmer Institute for Children's Behavioral Health, University of Oregon, ²Prevention Science Institute, University of Oregon, ³University of Oregon

Introduction: Risky technology and digital media (TDM) use is bidirectionally linked to adolescent sleep and mental health concerns. Brief motivational interviewing (MI) can promote adolescent behavior change. The TECH Check-Up (TCU) is an MI-informed, school-based intervention to promote healthy TDM use. We examined key informant perspectives (adolescents, their caregivers, and middle school teachers) about incorporating sleep guidance into TCU content.

Methods: Using guides informed by the Consolidated Framework for Implementation Research (CFIR) we conducted 8 focus groups (N=66) at 3 schools with (a) adolescents (2 groups, n=15;

Mage= 12.7 years, 40% girls, 53% Black, 20% Latine, 20% White, 7% Native American/Alaska Native), (b) caregivers (3 groups, n=22; Mage = 44.2 years, 82% mothers, 9% Asian/Pacific Islander, 14% Black, 5% Latine, 5% Native American/Alaska Native; 64% White), and (c) school staff (3 groups; n=29; Mage = 41.9 years, 59% women, 3% Asian/Pacific Islander, 14% Black, 3% Latine, 3% Multiracial/another race, 76% White). Rapid qualitative analysis was used to identify key CFIR constructs (beliefs, attitudes, behaviors) related to technology use and sleep to inform TCU content. We identified convergence and divergence in themes across informant groups.

Results: The theme "TDM use as a sleep barrier" emerged across adolescent, caregiver, and school staff groups. Both adolescents and caregivers described "nighttime TDM use limits" including do-not-disturb functions and finding alternative bedtime activities. Caregivers noted that although confiscating devices reduced TDM use, this sometimes created an adversarial dynamic. Most CFIR-related themes pertained to inner setting (i.e., school or family-related) characteristics linked to TCU content and compatibility with school needs. Staff identified student daytime sleepiness as a potential indicator of students that could benefit from a TDM use intervention. Although all informant groups expressed positive perceptions about TCU content overall, only staff emphasized the need to include sleep-related strategies in the intervention.

Conclusion: Middle schoolers, caregivers, and school staff converged in identifying TDM use as a sleep barrier. Only staff raised the need to include sleep guidance in the intervention. Research exploring acceptability and outcomes of integrated sleep and TDM use interventions for adolescents is needed.

Support (if any): University of Oregon (PI: Doty)

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0951

SLEEP PRACTICES IN SECOND THROUGH FOURTH GRADE STUDENTS IN A RURAL ELEMENTARY SCHOOL

Christine Feeley, Erin Thornton

Auburn University College of Nursing

Introduction: There is growing recognition of how critical sleep is for children's health and wellbeing, and the impact sleep habits make. However, many children and families still report unhealthy sleep habits or inadequate sleep. This project aims to describe sleep habits in 8-10 year olds attending an elementary school in a rural area.

Methods: TigerCHAT is a school-based health education program designed for children in K-6th grades and focused on rural communities. It consists of 45-minute sessions addressing various health topics, including sleep, delivered over 4 weeks. Data are collected after IRB approval. In fall of 2025, nursing students led small groups of students in a sleep educational module during their gym period. Before education began, 171 2nd, 3rd, and 4th grade students filled out the Pediatric Sleep Practices- Short Form Questionnaire.

Results: To describe sleep patterns in this population, we analyzed frequencies, percentages, and correlations. The majority of students reported they "sometimes" followed a bedtime routine (43.4%, n=75), always watched TV before bed (33.9%, n= 58) or almost always (26.3%, n=45), and went to bed at the same time every night (always: 45%, n=77; almost always: 32.1%, n=55). Notably, a majority of students reported using a cell phone before

bed (67.25%, $n=115$). Few students reported needing someone there to fall asleep (31%, $n=53$). There were significant correlations between phone use and having a bedtime routine ($p<.001$, $r=.803$), and between gaming before bed and maintaining a consistent bedtime ($p<.001$, $r=.484$).

Conclusion: Children and families may need more guidance on technology use before bed. Although most children reported following a bedtime routine, many of those routines included screen time, which may be an area for future research.

Support (if any):

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0952

ASSOCIATION OF AIR QUALITY WITH SLEEP DISORDERS IN NORMALLY DEVELOPING 2-18-YEAR-OLDS: REAL WORLD DATA FROM AN ONGOING OBSERVATIONAL STUDY

S.N. Shubha¹, Biswaroop Chakrabarty², Sanjeev Kothare³, Sheffali Gulati¹, Prashant Jauhari¹, Harsh Piwal¹, Harshal Salve¹, Ashish D. Upadhyay¹

¹AIIMS, New Delhi, ²AIIMS, New Delhi-29, India, ³Cohen Children's Medical Center- Northwell Health

Introduction: Majority of world population resides in areas with air quality index (AQI) exceeding the acceptable standards set by World Health Organization. Research from areas with poor AQI have shown association of sleep disorders with air pollutants (particulate matter [PM10 and PM2.5], ozone, carbon monoxide, nitrogen dioxide and sulphur dioxide) that contribute towards air quality index (AQI). This ongoing study of 18 months duration from June 2025 is evaluating the association between AQI and sleep disorders in normally developing 2-18-year-olds from New Delhi, India.

Methods: Subjects are being screened for sleep disorders using the Childhood and Adolescent Sleep Evaluation Questionnaire (CASEQ) at a tertiary-care teaching hospital by systematic random sampling. Screen-positives for sleep disorders are evaluated by overnight polysomnography and assigned an ICSD-3 based diagnosis. Daily AQI and the predominant air pollutant are noted from SAMEER, the official mobile application of Indian Central Pollution Control Board. Monthly prevalence of sleep disorders is being correlated with the combined mean AQI of Delhi for that month and the preceding month.

Results: Overall, 212 cases have been enrolled from June till November 2025 (mean age 9.1 ± 3.5 years; 62.1% males, 59/212 [27.8%] with final diagnosis of sleep disorder). The most common ICSD-3 diagnoses are periodic limb movement disorders (75%) and obstructive sleep apnea (54.5%). Multiple diagnoses were seen in 63.6%. The most common symptoms on initial CASEQ screening are sleep related movement disorder (77.8%) and insomnia (59.3%). The prevalence of sleep disorders is higher during June (29.3%), October (42.9%) and November (48.5%) with higher combined mean AQI noted for the corresponding time periods (May-June:155.4, September-October:165.3, and October-November:287.7) and lower during July, August and September with corresponding lower AQIs (11.8%, 109; 17.4%, 83.5; 96.8, 25%) ($r=0.86$). The predominant pollutants during higher AQI months are PM10 and ozone whereas carbon monoxide predominates lower AQI months.

Conclusion: Significant correlation exists between prevalence of sleep disorders and AQI. PM10 and ozone may be central to health hazards of air pollution. Future studies should focus on causality establishment exploring biological pathways, longitudinal follow-ups, and controlling for multiple environmental determinants.

Support (if any):

Abstract citation ID: **zsag091.0952**

0953

MULTIFACETED EFFECT OF SLEEP PROBLEMS ON EMOTION DYSREGULATION IN INDIVIDUALS WITH ASD

Toru Ishii, Pahnwat Taweeseedt, Eliana Gropman, Bohye Kim, Emma Baker, Christina Chick, Isabelle Cotto, Jennifer Phillips, Booil Jo, Antonio Hardan, Makoto Kawai, Ruth O'Hara, Joachim Hallmayer Stanford University

Introduction: Sleep disturbances are known to be closely linked to emotion dysregulation (ED) across various psychiatric disorders. In individuals with autism spectrum disorder (ASD), the complex interaction of diverse symptoms is assumed to underlie difficulties in emotion regulation, whereas the presence of ED may, in turn, exacerbate other symptoms. However, despite the high prevalence of sleep problems among children with autism, their impact on ED has not been well recognized. The present study aimed to examine how, and to what extent, sleep problems in children with autism influence the association between ED and ASD behaviors.

Methods: Ninety-five individuals with ASD (25 females; age: 10.56 ± 3.67 years; range: 4-17) participated in the study. The Children's Sleep Habits Questionnaire and Child Behavior Checklist Dysregulation Profile were used to assess subjective sleep problems and ED, respectively. Other ASD behaviors were assessed using the Social Responsiveness Scale, 2nd Edition, the Repetitive Behavior Scale-Revised, and the Sensory Profile, 2nd Edition. Pearson correlation and regression analyses examined associations among ASD behaviors, ED, and sleep problems. To test the mediating effect of sleep problems on the relationship between ASD behaviors and ED as the outcome, Hayes' PROCESS macro was used.

Results: 1) More severe parent-reported sleep problems were shown to be associated with greater ED severity. 2) Social communication, restricted and repetitive behaviors, and sensory sensitivity in children with autism were all significantly related to ED. 3) The mediation analyses revealed a significant indirect effect of social communication, restricted and repetitive behaviors, and sensory sensitivity on ED through sleep problems ($\beta=0.37$, 95%CI = [0.17 0.58], $\beta=0.39$, 95%CI = [0.19 0.62], and $\beta=0.41$, 95%CI = [0.20 0.66], respectively).

Conclusion: Our preliminary findings with cross-sectional data indicate that sleep problems are not merely co-occurring features of ASD but serve as a mediating factor through which core autistic behaviors and sensory experiences contribute to ED. This suggests that sleep disturbances exert multifaceted influences on the diverse symptom domains of autism, potentially serving as an aggravating factor. These results underscore the importance of targeting sleep problems as a potential therapeutic intervention for improving ED in individuals with autism.

Support (if any):

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0954

PERCEIVED STRESS, ACCULTURATION, AND SLEEP AMONG IMMIGRANT AND NON-IMMIGRANT MOTHERS

Shambhavi Thakur¹, Carmela Alcantara², Sarah Berger³, Monica Ordway⁴, Natalie Barnett⁵, Maristella Lucchini⁵

¹Nanit, ²Columbia University School of Social Work, ³City University of New York, ⁴Yale University, ⁵Nanit Lab

Introduction: Recent research highlights persistent sleep disparities by immigrant status, yet less is known about the upstream psychosocial determinants, particularly among new parents, needed to guide tailored support. This study examines generational differences in acculturation and perceived stress and how they relate to sleep among parents of infants.

Methods: 1,274 mothers of children 0–24 months (10.07 ± 6.8) participated in this study. 957 were non-immigrant, 134 first-generation, and 183 second-generation. Participants completed the Perceived Stress Scale (PSS) and the Stephenson Multigroup Acculturation Scale (SMAS) consisting of two subscales: Ethnic Society Immersion (ESI), indicating engagement with one's heritage culture, and Dominant Society Immersion (DSI), indicating engagement with mainstream U.S. cultural norms. Sleep outcomes included the overall Pittsburgh Sleep Quality Index (PSQI) score and seven individual components. Acculturation differences were assessed with independent samples t-tests. Generational status' association with parental stress was tested with multiple linear regressions controlling for parent age, income, education, and employment. Associations between perceived stress and maternal sleep outcomes, as well as associations between acculturation and mothers' sleep, were examined using linear regression adjusting for child's age.

Results: Second-generation mothers had the highest perceived stress levels ($M=16.98 \pm 6.68, p < 0.001$). Higher perceived stress was associated with higher global PSQI scores ($\beta=0.23, SE=0.01, p < 0.001$), poorer sleep quality ($\beta=0.04, SE=0.003, p < 0.001$), longer sleep latency ($\beta=0.04, SE=0.004, p < 0.001$), shorter sleep duration ($\beta=0.03, SE=0.004, p < 0.001$), lower sleep efficiency ($\beta=0.04, SE=0.005, p < 0.001$), greater sleep disturbance ($\beta=0.02, SE=0.002, p < 0.001$), more frequent sleep medication use ($\beta=0.02, SE=0.004, p < 0.001$), and greater daytime dysfunction ($\beta=0.06, SE=0.003, p < 0.001$). Second-generation mothers reported significantly higher DSI ($M=3.71 \pm 0.28, p < 0.001$) than first-generation mothers ($M=3.5 \pm 0.28, p < 0.001$), but no differences in ESI. Higher ESI was associated with better sleep, including better overall sleep quality ($\beta=-0.79, SE=0.39, p=0.04$) and higher sleep efficiency ($\beta=-0.17, SE=0.05, p=0.002$). Similarly, higher DSI was associated with lower daytime dysfunction ($\beta=-0.28, SE=0.12, p=0.023$).

Conclusion: These findings highlight differences in acculturation and perceived stress across immigrant generational groups. We found that second generation immigrant mothers show greater dominant-society immersion and report higher perceived stress than first-generation and non-immigrant mothers. In turn,

higher perceived stress and weaker ethnic-society immersion are associated with worse parental sleep, suggesting potential psychosocial pathways that link generational status to sleep health.

Support (if any):

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0955

POLYSOMNOGRAPHIC OUTCOMES FROM A DIRECT TO SLEEP LAB REFERRAL PROGRAM

Matthew Balog, Darius Loghmanee, Innessa Donskoy, Ayelet Snow
Advocate Children's Hospital

Introduction: Excessive wait times limit the diagnosis and treatment of obstructive sleep apnea (OSA) in pediatrics worldwide due to limited access to sleep medicine providers, in-lab polysomnography, and surgical treatment for OSA. Further, pediatric patients with public insurance experience higher wait times than their private insurance counterparts, exacerbating disparities in health outcomes. To streamline time to diagnosis and treatment, our department implemented a direct to sleep lab referral process for select specialty care and Primary Care Providers (PCPs) who were trained by our department on identification of sleep related breathing disorders (SRBD). This study looks for differences in severity of sleep disordered breathing between different referring providers.

Methods: In this retrospective chart review, an electronic medical record (EMR) query for patients above 1 year old and under 18 years old who completed a baseline polysomnogram from 1/1/2023 to 10/31/2025 was performed. PSGs completed prior to MSLTs and any post-operative PSGs were excluded from the dataset. The query yielded a convenience sample of 4,014 subjects. AHIs were compared among provider categories.

Results: Twelve ordering provider categories were identified. Varying PSG completion counts and average AHIs among specialties were seen. Average AHIs ranged from 4.5/hr. to 16.9/hr. in 2023, 2.0/hr. to 27.4/hr. in 2024, and 0.1/hr. to 16.3/hr. in 2025. No statistical significance in average AHI was seen between sleep providers and outside providers for any year apart from the following low-referring outliers: critical care in 2023, neurosurgery in 2024, and urology in 2025. Through the years, PSGs with AHIs < 1 /hr. were seen less frequently with 46.9% in 2023, 46.8% in 2024, and 38.4% in 2025.

Conclusion: This study demonstrates that providers outside of sleep medicine can identify patients who need in-lab polysomnography comparably to sleep medicine providers. Through close collaboration and training, PCPs who screen and make direct to sleep lab referrals, thereby reducing wait times without significant differences in severity of sleep disordered breathing. While further study is required to evaluate other elements of care including age at diagnosis and other sleep study parameters, these results suggest training new resources is a viable way to improve sleep health for children.

Support (if any): None

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0956

SLEEP HEALTH IN JOUBERT SYNDROME: EXPLORING QUALITY OF LIFE AND ASSOCIATED SLEEP CHALLENGESSuha Mahi Eldin¹, Jade Turner², Jennifer Dempsey¹, Weston Powell³, Daniel Doherty⁴, Maida Chen⁵¹University of Washington, ²Seattle Children's Research Institute, ³Seattle Children's Research Institute, Center for Respiratory Biology and Therapeutics, ⁴Seattle Children's Hospital, ⁵Seattle Children's Hospital/University of Washington

Introduction: Joubert Syndrome and Related Disorders (JSRD) are a group of rare neurodevelopmental conditions characterized by congenital cerebellar and brainstem malformations, most notably the “molar tooth sign” on neuroimaging. Sleep disordered breathing (SDB) has been described in JSRD, but little data exist on non-respiratory disorders, despite frequent descriptions of restless sleep, insomnia, and altered sleep-wake cycles. The aim of this study was to use validated sleep questionnaires to start characterizing the full breadth of sleep disorders in individuals with JSRD and their caregivers.

Methods: Caregivers and/or participants with JSRD filled out on-line questionnaires including the Obstructive Sleep Apnea - 18 (OSA-18), Children's Sleep Habits Questionnaire (CSHQ), Pediatric Sleep Questionnaire (PSQ), PROMIS Sleep-Related Impairment, Morning-Eveningness Chronotype Questionnaire (MECQ), and provided demographic information, comorbidity profiles, and sleep study histories. SPSS was used to perform preliminary descriptive statistical analyses. Human subjects approval was obtained through the University of Washington.

Results: To date, 94 participants have completed the survey (mean age 14.5 ± 10.6 , 40% Female). Fifty percent of participants reported having undergone a sleep study, and 33% reported a diagnosis of SDB. In contrast, 89%, 86% and 42% of respondents reported scores above clinical cutoffs for the OSA-18, PSQ, and CSHQ respectively, suggesting much higher rates of SDB. PROMIS scores showed sleep-related impairment in 62% of parents and 51% of participants (via parent proxy questionnaire). Beyond SDB disturbances, restless sleep (reported by 56% of participants), insomnia symptoms (67% of participants/caregivers reported trouble sleeping), and circadian dysregulation emerged as common contributors to elevated scores. Caregivers consistently reported significant negative impact on daytime behavior, attention, mood, and overall family functioning.

Conclusion: Individuals with JSRD exhibit high rates of sleep disturbance across multiple domains, with subjective measures identifying far more impairment than reflected in reported diagnostic rates of SDB. Restless sleep, insomnia, and circadian misalignment may be under-recognized contributors to morbidity. These findings highlight the need for improved clinical screening, targeted evaluation, and JSRD-specific treatment strategies, as well as continued enrollment in ongoing research efforts to better characterize sleep phenotypes in this population.

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0957

FRAGMENTED AND REDUCED CONSOLIDATED SLEEP IN A PEDIATRIC GENETIC METABOLIC DISORDER: GLUT1 DEFICIENCY SYNDROME AS CASE STUDYCarlo Alberto Quaranta¹, Gauri Kathote², Mattia Bonzanni², Renato Borgatti¹, Michele Terzaghi³, Valentina De Giorgis⁴, Juan M. Pascual²¹Child Neurology and Psychiatry Unit, IRCCS Mondino Foundation, Full Member of ERN EpiCARE, Pavia, Italy, ²Division of Child Neurology, Weill Cornell Medicine, Cornell University, ³Unit of Sleep Medicine and Epilepsy, IRCCS Mondino Foundation, Pavia, Italy, ⁴Child Neurology and Psychiatry Unit, IRCCS Mondino Foundation, Full Member of ERN EpiCARE, Pavia, It

Introduction: Sleep and metabolism interact bidirectionally, yet the metabolic requirements of sleep remain understudied. Pediatric genetic metabolic disorders provide a unique window into how metabolism shapes sleep physiology during development. GLUT1 deficiency syndrome (G1D) is a rare monogenic disease characterized by reduced cerebral glucose levels, with symptoms including epilepsy, movement disorders and intellectual disability. A third of G1D patients reported sleep disturbances in a recent Natural History study. Thus, our aim is to characterize sleep structure in a G1D cohort. Leveraging an age-matched normative populations, we identified lighter and fragmented sleep in G1D.

Methods: In a cohort of genetically confirmed G1D population (n=45) we preliminary analyzed overnight EEG (n=10). Standard sleep-stage scoring (AASM criteria) was performed, quantifying total sleep time, wake after sleep onset, REM latency, Sleep Fragmentation Index, REM interruptions, and stage distribution. A normative population (n= 267) was selected from Retrospective Analysis of Sleep in Pediatric, Cleveland Children's Sleep and Health Study and Queensland Children's Hospital data. For each sleep descriptor, normative data was fitted with a linear mixed effect model (MATLAB) using the interaction of age and sex. Chi-square analysis (two-sided, Fisher's method) was used to compute group-level alignment between G1D and the normative population. Relative likelihood (proxy of adherence to normative population for a single patient) was computed for each sleep metric.

Results: Compared to age- and sex-matched normative population, the G1D cohort (n=10) showed significantly higher N1 stage percentage ($\chi^2(20)=39.85, p=8 \cdot 10^{-4}$), Sleep Fragmentation Index ($\chi^2(20)=91.97, p=1 \cdot 10^{-12}$), and REM interruptions ($\chi^2(20)=113.54, p=1 \cdot 10^{-17}$). Other sleep metrics were not statistically different. Across all descriptors, regardless of significance, G1D population showed a wide spectrum of sleep patterns, ranging from mild deviation to not-normative. Geometric mean of the relative likelihood across patients (normative=1; atypical=0) averaged 0.26 ± 0.16 (between 1.5 and 2.5 standard deviation from the normative mean), indicative of a moderate atypical sleep architecture at the group-level.

Conclusion: G1D cohort showed atypical sleep profile, with fragmented architecture and increased N1-sleep. In this

first-of-its-kind sleep study in this pediatric genetic metabolic disorder, findings indicate that cerebral glucose hypometabolism is sufficient to disrupt sleep macroarchitecture, highlighting metabolism's critical role in shaping sleep architecture during neurodevelopment.

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0958

SLEEP AND LIVING ENVIRONMENT FOR YOUTH RESIDING IN JUVENILE REHABILITATION TREATMENT AND DETENTION FACILITIES

Sara Jaffie¹, Madelyn Beckett¹, Emily Dame¹, Kaia Schomburg¹, Marianna Carlucci¹, Stephanie Crowley², Dylan Jackson³, Tamar Mendelson³, Amy Wolfson¹

¹Loyola University Maryland, ²Rush University, ³Johns Hopkins University

Introduction: Adolescents experience a shift towards later sleep and circadian timing, making them vulnerable to misaligned sleep schedules and insufficient sleep, which can have physical, emotional, behavioral consequences. Building on prior work in juvenile justice facilities in Maryland, we assessed potential sleep health risks and sleep-wake environments in the Department of Youth Rehabilitation Services (DYRS) detention (YSC) and rehabilitation (NB) facilities in Washington, DC.

Methods: Using a Sleep Justice Observational Checklist previously devised by our team in 2019, researchers examined natural and artificial light exposure via window quantity and size and lights in sleeping and non-sleeping areas. Daytime illuminance (photopic lux) was measured in all areas with a light meter in sitting and standing positions. Sleeping arrangements and technology exposure were also captured. 24-hour schedules for each facility were examined to understand daily routines.

Results: Both facilities had units with a central common area and connecting single-bed bedrooms; YSC had rooms with a sink/toilet, while NB had shared bathrooms off the common space. Residents (ages 12-20 years) spent most of their day in sleeping areas (~9 h), common areas (7-8 h), and classrooms (4-7 h/week-day). Averaged illuminance indicated that YSC bedrooms were brighter than NB bedrooms (255.5 lux, 164.5 lux, respectively). Lights-on times ranged from 6-7 a.m. in YSC and 6-9 a.m. in NB. "Bedtime" (youth sent to bedrooms) ranged from 8:00-8:45 p.m. in NB, with lights-off at 8:45p.m. "Bedtime" at YSC ranged from 8:30-9:45 p.m. with lights-off at 9:45p.m. NB had more artificial lights (AL) in their common area (ALNB= 16, ALYSC= 10) and classrooms (ALNB= 9, ALYSC= 4) and more windows (W) in their common area (WNB= 42, WYSC= 7), as well as natural light exposure through outdoor walkways between buildings.

Conclusion: Preliminary findings indicate variation in sleep environments and schedules between facilities. Further analyses and

data collection from the youth themselves will examine how these conditions interact with sleep-wake patterns and emotional well-being, and findings will help inform recommendations aimed at improving their sleep quality while in DYRS facilities.

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0959

MEASURES TO IMPROVE SLEEP PATTERNS IN NEONATES IN THE NEONATAL INTENSIVE CARE UNIT AS AN INTERVENTION TO ENHANCE PROGNOSIS

Alejandra I. Contreras Rivas, Debora Yoaly Arana Lechuga, Oscar Sanchez-Escandon

ABC Medical Center

Introduction: Background Sleep is a critical biological process for brain maturation, synaptic organization, and neurodevelopment during the neonatal period. In Neonatal Intensive Care Units (NICUs), environmental stressors such as excessive light, noise, and frequent handling disrupt physiological sleep-wake organization, potentially affecting recovery and prognosis. Despite increasing evidence linking sleep quality to neurodevelopmental outcomes, sleep-protective strategies remain insufficiently implemented in NICUs.

Methods: We performed a prospective interventional study including 35 neonates admitted to the NICU with gestational ages ranging from 26 to 38 weeks. Diagnoses included neonatal sepsis (n=8), germinal matrix hemorrhage (n=12), severe prematurity with marked neurological immaturity (n=15), and other associated critical conditions. All neonates underwent polysomnographic (PSG) studies adapted for neonatal age before and after implementation of sleep-protective measures, including reduction of ambient light and noise, scheduled maternal contact periods, and the use of a prototype NICU cradle designed to optimize sleep conditions.

Results: Post-intervention PSG demonstrated improved organization of sleep-wake cycles. By pathology: neonatal sepsis showed recovery in 6 of 8 cases (75%) with 2 deaths (25%); germinal matrix hemorrhage showed improvement in 11 of 12 neonates (91.7%) with 1 death (8.3%); severe neurological immaturity improved in 13 of 15 cases (86.7%) with 2 deaths (13.3%). Improvements were observed independently of length of hospitalization.

Conclusion: Targeted sleep-protective interventions in the NICU are associated with meaningful improvements in recovery and prognosis across multiple neonatal pathologies. Sleep optimization represents a low-risk, non-pharmacological strategy translating neurodevelopmental principles from bench to bedside, with potential long-term benefits for critically ill neonates.

Support (if any): no

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0960

EXTERNAL VALIDATION OF PATIENT RISK GROUPS DERIVED FROM A POLYSOMNOGRAPHY FOUNDATION MODELMatheus Araujo¹, Erhan Bilal², Kristen Beck², Samer Ghosn³, Nancy Foldvary-Schaefer⁴, Carl Saab³, Jeff Rogers², Reena Mehra⁵¹Cleveland Clinic, ²International Business Machines (IBM),³Cleveland Clinic Foundation, ⁴Sleep Disorders Center, Neurological Institute, Cleveland Clinic, ⁵University of Washington

Introduction: Polysomnography (PSG) reports rely on a handful of summary indices, such as the apnea-hypopnea index (AHI), which incompletely capture the multidimensional burden of sleep-disordered breathing and its downstream health risks. We developed a risk stratification pipeline that uses RoBERTa-based foundational model on raw PSG signals to generate patient-level embeddings and cluster individuals into risk-groups (RG1-RG5). Here, we perform external, independent validation of these clusters for predicting long-term cardiovascular outcomes using the publicly available community-based Sleep Heart Health Study (SHHS) dataset.

Methods: We fine-tuned a RoBERTa-based model on 10,000 clinical PSG recordings from Cleveland Clinic (Jan-2012 to Dec-2022) to match PSG scoring data (e.g, sleep stages and respiratory events). Latent embeddings from the model were aggregated at the patient-level and clustered using k-means with energy-distance criteria to define five risk-groups. The trained model and fixed cluster centroids were then applied without retraining to the raw PSG data in SHHS. Primary outcomes were all-cause mortality and incident heart failure. Kaplan-Meier analyses and Cox proportional hazards models, adjusted for age and sex, were performed in both datasets.

Results: In the clinical cohort, higher risk-groups showed significantly reduced survival for all-cause mortality (log-rank $p < 0.001$ for RG3-RG5 vs. RG1), with age/gender-adjusted hazards demonstrating a dose-response gradient: RG3 HR=1.51 (95% CI 1.17-1.96), RG4 HR=1.64 (95% CI 1.26-2.15), and RG5 HR=2.71 (95% CI 1.93-3.81), all versus RG1. For incident heart failure, RG5 had a significantly elevated risk (HR=1.67, 95% CI 1.12-2.48, $p=0.011$ vs. RG1). External validation in SHHS replicated these patterns despite differing PSG setups. For all-cause mortality, RG4 and RG5 remained associated with worse survival (log-rank $p < 0.001$; HR=1.31, 95% CI 1.07-1.62, and HR=1.58, 95% CI 1.07-2.32, respectively, vs. RG1). For incident heart failure, RG5 again emerged as a high-risk group (log-rank $p=0.003$; HR=2.13, 95% CI 1.11-4.09, $p=0.023$ vs. RG1).

Conclusion: Patient clusters derived from a fine-tuned PSG foundational model showed robust external validity for predicting all-cause mortality and incident heart failure in an independent cohort with substantially different PSG acquisition protocols. These findings support the generalizability and clinical utility of model-based PSG phenotyping for risk stratification.

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0961

ASSOCIATION OF NEWLY DIAGNOSED IDIOPATHIC HYPERSOMNIA AND RISK OF MAJOR ADVERSE CARDIOVASCULAR EVENTSRakesh Bhattacharjee¹, Christopher Kaufmann², Yishan Chen², Qing Liu², Atul Malhotra³, Emerson Wickwire⁴, Chien-Yu Tseng², Tianze Jiao²¹University of California San Diego, ²University of Florida, ³UC San Diego Health, ⁴University of Maryland School of Medicine

Introduction: Evidence suggests that hypersomnolence disorders, including narcolepsy, are associated with increased risk of major adverse cardiovascular events (MACE). Although most work has focused on narcolepsy, idiopathic hypersomnolence (IH) may also confer elevated cardiovascular risk. However, the long-term relationship between IH and MACE remains poorly characterized. We examined whether a new IH diagnosis is associated with increased incidence of MACE in a large, nationally representative claims cohort.

Methods: We constructed a retrospective cohort using MarketScan[®] data (2005–2022). IH patients were included at the index date of IH diagnosis and were required to have a confirmatory sleep study (multiple sleep latency test or polysomnography) within 60 days before the index date. A comparison cohort without IH was selected at a 1:500 ratio, matched on age, sex, and index date. We excluded individuals with narcolepsy, prior MACE (myocardial infarction, stroke, heart failure, unstable angina, or cardiovascular death), or subclinical cardiometabolic disease (type 2 diabetes, hypertension, hyperlipidemia, dyslipidemia, or NAFLD) within 1 year before index date, and those without ≥ 1 year of continuous enrollment prior to index. Baseline characteristics and crude MACE incidence rates were summarized for both cohorts.

Results: We identified 5,472 individuals with newly diagnosed IH and 1,206,603 matched comparison patients (67.0% vs 69.7% female, ≤ 25 years old: 26.1% vs. 32.4%; 26-45 years old: 49.3% vs. 49.8%; 46-65 years old: 24.6% vs. 17.8%). Sleep apnea (34.0% vs 2.2%), insomnia (4.7% vs. 1.1%), PLMD (3.0% vs. 0.1%), RLS (2.4% vs. 0.2%) was different between both groups. Among IH patients, the unadjusted incidence rate of MACE was 0.49 per 100 person-years (mean follow-up: 2.78 years), compared with 0.38 per 100 person-years in the comparison cohort (mean follow-up: 2.88 years).

Conclusion: Newly diagnosed IH was associated with a higher crude incidence of MACE compared with a large matched cohort without IH. To further reduce confounding, propensity score matching (1:3) will be conducted to balance baseline risk factors including sleep comorbidities, and adjusted hazard ratios will be estimated. These findings underscore the need for heightened cardiovascular risk assessment and early prevention in patients with IH.

Support (if any): Sleep Research Society Foundation (Grant #: 25-FRA-001).

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0962

PREVALENCE OF OBSTRUCTIVE SLEEP APNEA AMONG CONSECUTIVE PATIENTS WITH ATRIAL FIBRILLATION USING WATCHPAT HOME SLEEP TESTING

Sogol Javaheri

Brigham and Women's Hospital

Introduction: Obstructive sleep apnea (OSA) is highly prevalent in symptomatic atrial fibrillation (AF) patients undergoing ablation and may reduce the efficacy of rhythm control strategies in patients with AF. However, consecutive sleep testing has not been confirmed in a larger general AF population and less is known regarding the prevalence of OSA by subtype of AF.

Methods: In this pragmatic, phase IV prospective cohort study, we performed first-time testing for sleep apnea on consecutively enrolled ambulatory AF patients from outpatient clinics using a home sleep test. The primary outcome of our study was the prevalence of undiagnosed mild or moderate/severe OSA in the AF cohort.

Results: We performed sleep testing in 180 AF patients (126 paroxysmal (70%) and 54 persistent or long standing persistent (30%)). Among enrolled patients, 40 (31.3%) had undergone AF catheter ablation, 35 (27.3%) had undergone a previous cardioversion, and 51 (40.0%) had undergone no prior AF related procedure. The prevalence of undiagnosed OSA was 83.3% with 47.2% meeting moderate or severe criteria. Patients with persistent/longstanding persistent AF demonstrated the highest rates of OSA with 52 (96.3%) testing positive for OSA and with 35 (64.2%) demonstrating moderate/severe OSA.

Conclusion: Consecutive sleep testing in ambulatory AF patients enrolled from outpatient clinics, regardless of AF symptom status or AF treatment strategy, demonstrated a high prevalence of undiagnosed OSA with more severe OSA among those with persistent AF compared to non-paroxysmal AF. Our study demonstrates higher prevalence of OSA among those with persistent AF compared to paroxysmal AF as well. Widely used clinical prediction instruments cannot effectively be used to guide sleep testing decisions in AF patients and our results suggest routine sleep apnea testing should be strongly considered in the comprehensive evaluation of all AF patients, but particularly those with persistent AF.

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0963

OBSTRUCTIVE SLEEP APNEA AND ATRIAL FIBRILLATION RECURRENCE: REAL-WORLD ANALYSIS OF CONTINUOUS POSITIVE AIRWAY PRESSURE ADHERENCE THRESHOLDSRanda Elzein¹, Safa Elzein²¹SUNY Upstate Medical University, ²SUNY Upstate University Hospital

Introduction: Obstructive sleep apnea (OSA) contributes to atrial fibrillation (AF) through intermittent hypoxia, sympathetic activation, and atrial remodeling. Continuous positive airway pressure (CPAP) therapy mitigates these effects, but real-world adherence is inconsistent and the nightly threshold that yields cardiovascular benefit remains uncertain. This study examined the relationship between objective CPAP use and AF recurrence to define a clinically meaningful adherence target for secondary prevention.

Methods: A retrospective multicenter cohort of adults with polysomnography-confirmed OSA and paroxysmal or persistent AF who initiated CPAP between 2018 and 2024 was analyzed. Device-recorded CPAP data were collected at 90-day intervals. Adherence was classified as high (≥ 4 h/night on ≥ 70 % of nights), moderate (2–3.9 h/night), or low (< 2 h/night). The primary outcome was time to AF recurrence after electrical or pharmacologic cardioversion, verified by electrocardiogram or rhythm monitoring. Multivariable Cox proportional-hazards models adjusted for age, sex, body-mass index, hypertension, diabetes, coronary disease, and baseline apnea-hypopnea index. Sensitivity analyses excluded incomplete follow-up and antiarrhythmic nonadherence.

Results: High CPAP adherence was associated with a 38 % lower adjusted risk of recurrence compared with low adherence (hazard ratio 0.62, 95 % confidence interval 0.45–0.85; $p = 0.002$). Among 642 patients (mean age 63 ± 10 years; 41 % female; median apnea-hypopnea index 29 events/h), median follow-up was 18 months. AF recurrence occurred in 38 %. Moderate adherence showed a non-significant trend toward benefit (hazard ratio 0.83, 95 % confidence interval 0.64–1.07). Results were consistent across subgroups defined by OSA severity, cardiovascular comorbidities, and sex.

Conclusion: Higher CPAP adherence independently predicted lower AF recurrence in patients with OSA. A nightly threshold of ≥ 4 hours appears sufficient for measurable arrhythmia reduction. Integrating adherence-monitoring and behavioral reinforcement into multidisciplinary sleep-cardiology programs may enhance long-term cardiovascular outcomes.

Support (if any):

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0964

A MULTIDIMENSIONAL ASSESSMENT OF ACTIGRAPHY-MEASURED SLEEP AND 24-HOUR AMBULATORY BLOOD PRESSURE OUTCOMES IN THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSISChad Coleman¹, Suzanne Bertisch², Heming Wang², Murray Mittleman³, Shaun Purcell², Susan Redline²¹Brigham and Women's Hospital, Harvard Medical School,²Brigham and Women's Hospital, ³Harvard T.H. Chan School of Public Health

Introduction: Few population-based, longitudinal studies have examined the relationship between multidimensional sleep health and ambulatory blood pressure monitoring (ABPM) outcomes, which improves measurement accuracy in naturalistic settings of inadequate sleep.

Methods: We analyzed data from 593 Multi-Ethnic Study of Atherosclerosis participants. At Exam 5 (2010-2013), participants

wore an actigraph for 7 days, from which we estimated multi-dimensional sleep health metrics, including duration, regularity, timing, and fragmentation. At Exam 7 (2021-2024), participants underwent 24-hour ABPM. We assessed average nocturnal systolic (SBP) and diastolic blood pressure (DBP). We defined nocturnal hypertension as average nocturnal blood pressure $\geq 120/70$ mmHg and non-dipping nocturnal SBP and DBP as $< 10\%$ average decrease from wake-to-sleep. We used linear and log-Poisson regression, adjusted for Exam 5 socio-demographics, body mass index, cigarette smoking, alcohol intake, physical activity, and anti-hypertensive usage, to estimate mean differences (MDs) and prevalence ratios (PRs) and 95% confidence intervals (CIs).

Results: At Exam 7, mean nocturnal SBP/DBP were 118/64 mmHg. Prevalence of nocturnal hypertension and non-dipping SBP and DBP was 46.2%, 49.8%, and 38.8%, respectively. Compared to participants in the highest quartile of total sleep time (TST; ≥ 7.3 hours), participants in the lowest quartile (≤ 5.9 hours) had higher prevalence of nocturnal hypertension (PR=1.25, 95% CI=0.94-1.65) and non-dipping SBP (1.27 [0.97-1.64]) and DBP (1.21 [0.88-1.66]). These participants also had higher nocturnal SBP (MD=2.93, 95% CI=-0.97-6.83 mmHg) and DBP (1.46 [-0.66-3.57] mmHg). Participants in the highest quartile of irregularity had higher prevalence of nocturnal hypertension (TST variability: 1.27 [1.00-1.61]; sleep maintenance efficiency [SME] variability: 1.38 [1.06-1.80]), non-dipping nocturnal SBP (SME variability: 1.23 [0.96-1.57]), and DBP (midpoint variability: 1.24 [0.92-1.67]; TST variability: 1.30 [1.00-1.69]); continuous outcomes showed similar patterns. Compared to the lowest quartile of Sleep Fragmentation Index, participants in the highest quartile had higher prevalence of nocturnal hypertension (1.14 [0.89-1.46]) and non-dipping nocturnal SBP (1.40 [1.10-1.77]) and DBP (1.21 [0.92-1.60]). We observed similar, yet imprecise, results for nocturnal SBP (1.92 [-1.92-5.77] mmHg) and DBP (1.16 [-0.92-3.25] mmHg).

Conclusion: Actigraphy-measured short sleep duration, irregularity, and fragmentation were associated with nocturnal blood pressure outcomes, reinforcing the importance of ABPM and need for multidimensional composite sleep assessments.

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0965

LATER SLEEP TIMING IS RELATED TO WORSENE GLUCOSE TOLERANCE IN SOUTH ASIAN YOUTH LIKELY SECONDARY TO INCREASED VISCERAL FAT: THE CHARISMA STUDY

Talia Hitt¹, Cynthia Wang¹, Sara Malina², Andrea Kelly³, Francis Sgambati¹, Babette Zemel³, Jonathan Jun¹, Sheela Magge¹

¹Johns Hopkins University School of Medicine, ²University of Maryland School of Medicine, ³Children's Hospital of Philadelphia

Introduction: Adolescents have delayed and shorter sleep, which is associated with adverse metabolic consequences. We hypothesized that later sleep phase is associated with worse glucose tolerance in overweight youth.

Methods: The Charisma study enrolled youth aged 12-21y with BMI $\geq 80\%$ ile (or $\geq 23\text{kg/m}^2$ if $\geq 18\text{y}$) from three ancestry groups: South Asian (SA), African American (AA), and White (W). Participants completed actigraphy (14d, ActiGraph GT3XP-BTLE), oral glucose tolerance tests, and Hologic DXA scans to measure

visceral fat area (VF). We examined the association between mid-sleep time and 2-hour glucose using linear regression in the combined cohort, then examined whether ancestry and VF affected these associations in stratified analyses and interaction models.

Results: Participants (n=74, 38F) had median(IQR) age 19.1y(17.5, 20.9) and BMI-Z 1.1(0.64, 1.64). The ancestry groups (11 SA, 30 AA, 33 W) had similar demographics, except the SA group was older [SA: 20.7y(19.2, 21.6), AA: 18.4y(16.8, 20.0), W: 19.1y(17.3, 20.9), $p=0.02$], had higher VF [SA: 101.9cm²(95.2,121.4), AA: 74.9cm²(53.9,97.7), W: 91.0cm²(66.1,114.3), $p=0.03$] and later mid-sleep time vs W [SA: 5:50a(3:28a,7:23a), AA: 4:29a(3:34a, 5:45a), W:4:34a(3:53a, 5:10a), $p=0.04$]. In the full cohort, there was no association between mid-sleep time and 2-hour glucose unadjusted or adjusted for age, sex, BMIZ, ancestry, and sleep duration ($p=0.4$). In stratified analyses, only the SA group had higher 2-hour glucose with later mid-sleep time unadjusted($\beta=7.7$, $p=0.049$) and adjusted for the same variables ($\beta=13.1$, $p=0.04$), but lost significance if adjusted for VF in place of BMIZ($\beta=11.1$, $p=0.06$). In the overall cohort, there was a significant interaction between mid-sleep time and VF in predicting 2-hour glucose unadjusted ($p=0.003$) and adjusted for age, sex, group, and sleep duration ($p=0.011$), but no significant interactions by ancestry ($p=0.3$) or BMI ($p=0.7$) unadjusted.

Conclusion: In a combined cohort of overweight youth, glucose tolerance was not related to delayed sleep phase. However, SA youth with later sleep timing had worse glucose tolerance. SA youth exhibited higher VF area, and there was significant effect modification of VF on the relationship between sleep timing and glucose tolerance in the overall cohort. These results suggest that higher VF may influence susceptibility to the glycemic effects of delayed sleep phase.

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0966

YOUTH WITH DELAYED SLEEP PHASE HAVE HIGHER LEPTIN LEVELS: THE CHARISMA STUDY

Cynthia Wang¹, Sara Malina², Andrea Kelly³, Francis Sgambati¹, Jonathan Jun¹, Sheela Magge¹, Talia Hitt¹

¹Johns Hopkins University School of Medicine, ²University of Maryland School of Medicine, ³Children's Hospital of Philadelphia

Introduction: Adolescents have short and delayed sleep, which may have metabolic consequences. Leptin, an adipocytokine linked with adverse cardiometabolic outcomes when dysregulated, has been associated with shorter sleep in some adolescent studies. We hypothesized that shorter sleep duration and later sleep timing are associated with increased leptin in overweight youth.

Methods: We enrolled healthy youth 12-21y with BMI $\geq 80\%$ ile (or $\geq 23\text{kg/m}^2$ if $\geq 18\text{y}$) from three ancestry groups: South Asian (SA), African American (AA), and White (W). Participants wore actigraphy for 14d and underwent a fasting blood draw to measure leptin. We derived average sleep duration, mid-sleep time, and sleep onset. We examined the association between the outcome leptin (log-transformed due to non-normality) and main independent variables of sleep duration and timing using multi-variable linear while adjusting for confounders.

Results: Participants (n=74, 38F) had median(IQR) age 19.1y(17.5, 20.9), BMIZ 1.1(0.6, 1.6), leptin 24.6ng/mL(12.1, 54.4), sleep duration 7.5h(6.8, 8.0), sleep onset 12:58am(11:56pm, 1:48am) and mid-sleep time 4:34am(3:44am, 5:35am). In univariable models, BMIZ, age, sex, and ancestry were associated with leptin or sleep, and therefore these variables were included in multivariable models. Later mid-sleep time was associated with higher leptin, adjusting for BMIZ, sex, age, and ancestry [$p=0.01$]. Sleep duration and sleep onset were not associated with leptin. Ancestral groups were similar except for older age [11 SA of median age: 20.7y, 30 AA: 18.4y, 33 W: 19.1y, $p=0.02$] and later sleep in SA [sleep onset median: SA 1:48am, AA 12:58am, W 12:43am, $p=0.02$ vs W; mid-sleep time: SA 5:50am, AA 4:29am, W 4:34am, $p=0.04$ vs W]. We found that (1) in SA, longer sleep durations [$p=0.04$], later sleep onset [$p=0.02$], and later mid-sleep time [$p=0.02$] were associated with higher leptin; (2) in W, later mid-sleep time [$p=0.02$] was associated with higher leptin. The AA group did not have relationships between sleep and leptin. There was no effect modification by ancestry.

Conclusion: Later mid-sleep time was associated with higher leptin in overweight youth. These relationships differed across ancestral groups. Further studies are needed to examine if delayed sleep is a modifiable risk factor to help prevent cardiometabolic outcomes, and which factors may heighten ancestry-specific susceptibility.

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0967

ASSOCIATIONS OF SLEEP DURATION WITH INFLAMMATION, METABOLIC MARKERS, AND METABOLIC SYNDROME: FINDINGS FROM THE MIAMI HEART STUDY

Sergio Torralbas Fitz¹, Khurram Nasir², Raul E. Herrera³, Joshua M. Baker³, Wendy M. Cardenas³, Maham Rasool³, Theodore Feldman³, Jonathan Fialkow³, Harneet Walia¹

¹Baptist Health South Florida, ²Huston Methodist DeBakey Heart & Vascular Center, ³Miami Cardiac and Vascular Institute

Introduction: Short and long sleep duration are associated with adverse metabolic and inflammatory profiles, yet their multidimensional health correlates remain poorly defined in adults free of cardiovascular disease. We leveraged a population-based cohort of healthy individuals to examine the relationship between habitual sleep duration and metabolic and inflammatory biomarkers.

Methods: Participants from the Miami Heart Study (N = 2,443), all free of cardiovascular disease at baseline, completed fasting metabolic and inflammatory markers (including interleukin-6). Sleep duration was self-reported and categorized as short (< 7 hours), recommended (7–9 hours), or long (> 9 hours). Relationships between sleep duration and participant characteristics were examined using permutational multivariate analysis of variance based on Gower distances. Spearman correlation was used for continuous biomarkers and multinomial logistic regression for categorical predictors, with false discovery rate (FDR) correction.

Results: Hispanic ethnicity (OR = 0.86, $p < 0.001$), individuals with annual income \$25k–\$50k (OR = 0.60, $p = 0.012$) and \$50k–\$75k (OR = 0.56, $p = 0.004$) and type 2 diabetes (OR = 0.87, $p = 0.013$) reported short sleep duration. Participants with high blood

pressure were more likely to fall into the short or long sleep categories (OR = 0.94, $p = 0.021$). Shorter sleep duration demonstrated adverse metabolic and inflammatory correlates, including higher BMI ($\rho = -0.132$, $p < 0.001$), larger abdominal circumference ($\rho = -0.090$, $p < 0.001$), elevated IL-6 ($\rho = -0.059$, $p = 0.015$), higher HbA1c ($\rho = -0.051$, $p = 0.038$), greater body fat percentage ($\rho = -0.050$, $p = 0.040$), and lower HDL cholesterol ($\rho = 0.041$, $p = 0.035$). Triglycerides varied across sleep groups but lost significance after FDR correction. A U-shaped association was observed between sleep duration and the probability of Metabolic Syndrome, with significant nonlinear terms in minimally adjusted ($p = 0.0137$) and fully adjusted models ($p = 0.0245$).

Conclusion: In this cardiovascular disease-free cohort, sleep duration showed strong sociodemographic, metabolic, and inflammatory correlates. Both short and long sleep were associated with increased metabolic syndrome risk, underscoring sleep duration as a modifiable early indicator of cardiometabolic vulnerability in healthy adults.

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0968

MELATONIN USE AND HEART FAILURE: A RETROSPECTIVE OBSERVATIONAL STUDY

Jinal Gangar, Pradeep Sahota, Mahesh Thakkar
University of Missouri

Introduction: Melatonin is widely used as a sleep aid and is available over the counter in many countries. Although generally perceived as safe, recent studies have raised concerns about its cardiovascular effects, particularly in relation to heart failure (HF). A large multinational study presented at the American Heart Association (AHA) 2025 Scientific Sessions reported increased risk of HF and mortality with long term melatonin use, while other investigations suggested potential protective benefits. We conducted a retrospective cross sectional analysis as a preliminary evaluation of these associations in our patient population.

Methods: We defined three patient groups from October 2024 to October 2025: (1) all patients prescribed melatonin (n=4,697; demographic baseline), (2) patients with HF and melatonin use (n=1,054), and (3) patients who developed HF after melatonin use (n=109). Eligibility required age ≥ 10 years, documented melatonin prescription, or HF diagnosis using ICD 10 I50.x codes. Patients using melatonin combined with other herbal preparations or with incomplete demographic data were excluded. Age, race, and gender distributions were compared between Groups 2 and 3 using chi square tests.

Results: HF prevalence increased sharply with age, rising from < 3% in patients < 35 years to >35% in those ≥ 75 years. Male patients had slightly higher HF prevalence than females (23% vs. 21%). Racial differences were observed: White and Black patients showed similar absolute HF prevalence (~22–23%), but Black patients carried proportionally higher burden relative to their smaller population size. Among melatonin users who developed HF (Group 3), older adults (≥ 55 years) accounted for the majority of cases. Chi-square analysis revealed no statistically significant differences in age ($\chi^2=8.2$, $p=0.315$), sex ($\chi^2=0.00$, $p=1.000$), or race ($\chi^2=1.3$, $p=0.730$) distributions between Groups 2 and 3.

Conclusion: Although HF prevalence among melatonin users was substantial, particularly in older adults, statistical comparisons

did not demonstrate significant demographic differences between patients with HF and those who developed HF after melatonin use. These findings suggest melatonin may not independently drive HF risk, but the clustering of new HF diagnoses among melatonin users raises concern for potential harm in susceptible populations. Prospective studies are needed to clarify causality and guide safe prescribing practices.

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0969

OBSTRUCTIVE SLEEP APNEA RELATED BLOOD PRESSURE SURGES AS A RISK FOR SUBCLINICAL CARDIAC DYSFUNCTION

Santana Maria Bachaalany¹, Younghoon Kwon¹, Aneesh Sajan², Clara Farrehi¹, Edward Kim¹, Leah Mathew¹, Omran Awada¹, Queenee Li¹, Zachary Leonen¹, Yeilim Cho¹

¹University of Washington, ²Independent Researcher in Applied Analytics and Data Science

Introduction: Obstructive sleep apnea (OSA) is increasingly recognized as a significant cardiovascular stressor. Intermittent hypoxia and sympathetic activation during each apnea episode can provoke nocturnal blood pressure (BP) surges, which can increase the cardiovascular risk. We tested a hypothesis that BP surge would be more strongly associated with cardiac dysfunction than conventional OSA measures.

Methods: We prospectively enrolled adult subjects who underwent overnight polysomnography with continuous BP monitoring using the pulse arrival time method. Echocardiography was acquired for each participant to assess cardiac structure and function. Left ventricular (LV) systolic function (ejection fraction), systolic strain (average global longitudinal strain) and diastolic function (e/e': the higher the worse diastolic function) were derived. We first derived correlation between mean BP surge and apnea hypopnea index (AHI). Then, we performed multiple linear regression between mean BP surge and echocardiographic measures of interest adjusting for age and OSA severity class (no-mild [AHI< 15] and moderate-severe [AHI≥15]).

Results: We included 27 participants (mean age 48 years, 81% males, mean AHI 24). Average mean BP surge and max BP surge were 16.3 [4.2] and 31.5 [10.4] mmHg, respectively. There was moderate correlation between (mean and max) BP surge and AHI ($r=0.47$, $p=0.013$ and 0.37 , $p=0.05$). Subjects with moderate to severe OSA exhibited more significant mean BP surge than those with no to mild OSA (18.2 [4.5] vs. 13.6 mmHg [0.67], $p=0.003$). However, there was no difference in max BP surge between the two OSA severity groups. There was modest correlation between mean BP surge and LV diastolic function e/e' ($r=0.4$) but no correlation with LV systolic function parameters. There was a significant association between mean BP surge and LV diastolic function (e/e') while adjusting for age and OSA severity class. With every 10 mmHg increase in mean BP surge was associated with 2.4 higher e/e' values ($p=0.03$). However OSA severity class was not associated with left diastolic function e/e'.

Conclusion: OSA related BP surge, but not AHI, was associated with LV diastolic function.

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0970

RELATIONSHIP OF SLEEP AND SLEEP DISORDERED BREATHING WITH BLOOD PRESSURE DIPPING DURING SLEEP: PRELIMINARY FINDINGS FROM THE SANAR STUDY

Christian Agudelo¹, Wassim Tarraf², Barbara Junco¹, Sonya Kaur¹, Amber Pirzada³, Kevin Gonzalez⁴, Hector Gonzalez⁴, Susan Redline⁵, Murray Mittleman⁶, Maia Junco¹, Yasmin Mossavar-Rahmani⁷, Charles DeCarli⁸, Martha Daviglus⁹, Daniela Sotres-Alvarez¹⁰, Alberto Ramos¹¹

¹University of Miami, ²Wayne State University, ³Institute for Minority Health Research, ⁴University of California, ⁵Brigham and Women's Hospital, ⁶Harvard T.H. Chan School of Public Health, ⁷Albert Einstein College of Medicine, ⁸UC Davis, ⁹University of Illinois Chicago, ¹⁰University of North Carolina at Chapel Hill, ¹¹University of Miami School of Medicine

Introduction: Non-dipping blood pressure during sleep (NDBP) could influence the effect of sleep duration, sleep disturbances and sleep-disordered breathing (SDB) on adverse health outcomes. NDBP has been insufficiently studied in Hispanic/Latino populations which have a large burden of SDB and sleep disturbances. Here, we aim to examine the associations between SDB, sleep duration and sleep disturbances with systolic and diastolic blood pressure (BP) dipping using preliminary data from the Hispanic Community Health Study/Study of Latinos.

Methods: We obtained 24-hour ambulatory blood pressure (BP) monitoring, self-reported validated sleep questionnaires and type-3 sleep apnea studies in 1,434 Hispanic/Latino participants (age ≥50 years). BP dipping was defined as the % decrease in mean systolic or diastolic BP during the sleep period. BP dipping categories were classified as excessive (>20%), preserved (10-20%), blunted/absent (0-10%), or paradoxical (< 0%). We used multinomial logit models to examine the associations of SDB, and sleep disturbances, with the BP dipping categories of preserved (reference), excessive, and blunted/absent and paradoxical dipping. Primary exposures were self-reported sleep duration categories of < 7, 7< 9 (reference), >9 hours. Insomnia (Women's Health Initiative Insomnia Rating scale- absent: < 9, present: ≥9), sleepiness (Epworth sleepiness scale- non-excessive: < 10, excessive daytime sleepiness: ≥10), and respiratory-event index REI3%: no SDB: < 5 [reference], mild: 5-< 15, moderate:15-< 30, severe: ≥30. Covariates included sex, age, BMI, and maximum systolic or diastolic BP in clinic.

Results: The sample was two-thirds female with mean age 67.5±6.4 years and mean BMI 30.1±5.6 kg/m². In adjusted models, long sleep and sleepiness were associated increased relative risk ratios (RRR) for blunted/absent (BA) (BA: RRR9+hrs= 1.12, RRRrei15-< 30=1.16 and RRRrei30+=1.16; and paradoxical (P) P: RRR9+hrs= 1.38, RRRahi15-< 30=1.35, RRRahi30+=1.31, and RRRexcessiveESS=1.55) systolic dipping; as well as diastolic dipping (AB): RRR9+hrs= 1.12, RRRahi15-< 30=1.29; (P): RRR9+hrs= 1.86, RRRsleepiness=1.80) vs. preserved dipping. Wide confidence intervals reflect the preliminary nature of the data and limited statistical power.

Conclusion: Long sleep duration, excessive daytime sleepiness, and SDB were associated with NDBP, suggesting a potential strategy to reduce adverse health outcomes.

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0971

THE PULSE OF HYPOXIA: EVENT-RELATED HEART RATE SURGES LINK HYPOXIC BURDEN TO VASCULAR DAMAGE

Henrique Terceiro¹, Paula Alana Seixas¹, Laís Mota², Gabriela Brito¹, Lorenzo Cirri³, Cristina Salles²

¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Royal Brompton Hospital, Guy's and St. Thomas NHS Foundation Trust

Introduction: The respiratory event-specific Heart Rate Delta (Δ HR) reflects the acute autonomic response to intermittent hypoxia and has emerged as a more sensitive risk biomarker than the isolated Apnea-Hypopnea Index (AHI) in Obstructive Sleep Apnea (OSA), especially when analyzed with the hypoxic burden (HB). Objective: To evaluate the association between Δ HR, HB, Oxygen Desaturation Index (ODI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Blood Pressure (MBP) and Body Mass Index (BMI) in patients with OSA.

Methods: Methods: This was a cross-sectional study nested within a cohort, where 36 individuals were evaluated, 58.1% of whom were women, with a mean age of 53.95 $\pm$ 11.86 years. Patients with OSA were included, and measurements were collected for Δ HR, Body Mass Index (BMI), Oxygen Desaturation Index (ODI), SBP, DBP, MBP and HB. HB was measured by considering the area under the curve of oxyhemoglobin desaturation greater than 3%.

Results: Results: The mean and standard deviation for key variables were: CH 93.07 $\pm$ 181.10, sleep ODI 19.89 $\pm$ 43.64, ODI 20.65 $\pm$ 41.29, minimum HR 52.32 $\pm$ 6.95, mean HR 70.09 $\pm$ 9.67, maximum HR 110.09 $\pm$ 11.71, SBP 134.02 $\pm$ 18.98, diastolic blood pressure (DBP) 84.33 $\pm$ 14.24. We observed that the correlation of Δ FC with HB ($r = 0.630$; $p = 0.002$), ODI ($r = 0.643$; $p = 0.001$), sleep ODI ($r = 0.667$; $p = 0.001$), age ($r = 0.476$; $p = 0.025$), BMI ($r = 0.527$; $p = 0.012$), SBP ($r = 0.223$; $p = 0.319$), DBP ($r = 0.116$; $p = 0.606$), minimum HR ($r = 0.028$; $p = 0.903$), maximum HR ($r = 0.336$; $p = 0.015$), and MBP ($r = 0.188$; $p = 0.401$).

Conclusion: Conclusion: Individuals with OSA and an elevated Δ HR in the context of a high HB present a higher risk of cardiovascular morbidity and mortality and greater carotid intima-media thickness. This suggests that the integration of Δ HR and HB refines risk stratification beyond AHI and subjective sleepiness, and helps guide who could benefit most from cardioprotective interventions, including CPAP use.

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0972

ASSOCIATION BETWEEN CHANGES TO SLEEP ROUTINES AND CARDIOMETABOLIC RISK DURING RAMADAN: A META-ANALYSIS AND META-REGRESSION

Grace Lucas¹, Marta Williams², Anne Fladger³, Rebecca Robbins⁴

¹University of California, San Diego School of Medicine, ²Department of Otolaryngology-Head and Neck Surgery, University of Minnesota, ³Countway Library of Medicine, Harvard Medical, ⁴Division of Sleep Medicine, Harvard Medical School

Introduction: Ramadan observance is characterized by major lifestyle changes, including shifts in sleep and dietary patterns.

Previous meta-analyses have shown reductions in sleep duration and quality during Ramadan, while reviews of cardiometabolic outcomes report mixed findings. However, no prior synthesis has explicitly examined how Ramadan-related sleep disruptions may mediate changes in cardiometabolic health. Our meta-analysis and meta-regression address this gap by exploring the relationship between Ramadan-associated sleep changes and cardiometabolic risk factors.

Methods: We conducted a meta-analysis and meta regression according to PRISMA guidelines. We identified studies examining both sleep and cardiometabolic risk factors before and after Ramadan. Studies were screened independently by two reviewers, data were extracted, and quality of included studies was assessed. Then we performed meta-analysis and meta-regression.

Results: A total of 11 studies with 2684 participants met inclusion for the meta-analysis. Meta-analysis revealed mean differences in: sleep duration of -0.61 (95% CI: -1.29 to 0.06); BMI of -0.52 (95% CI: -0.96 to -0.08); body weight of -1.07 (95% CI: -1.70 to -0.44), systolic blood pressure of -6.75 (95% CI: -8.74 to -4.75); and diastolic blood pressure of -1.43 (95% CI: -2.06 to -0.81). There was a significant positive relationship between sleep duration and body weight (coefficient: 0.52, 95% CI: 0.13 to 0.90).

Conclusion: Our meta-analysis revealed that Ramadan was associated with a negative trend in sleep duration, and a significant decrease in BMI, body weight, systolic blood pressure, and diastolic blood pressure. The positive relationship between sleep duration and body weight revealed in our meta-regression contrasts with established literature in non-fasting populations, suggesting Ramadan-specific mechanisms may be at play. Heterogeneity was observed in several models, suggesting further studies using objective sleep measures and standardized timelines are needed to better understand associations between changes in sleep duration associated with Ramadan observance and cardiometabolic risk factors.

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0973

CIRCADIAN PHASE DRIFT AND SLEEP-CIRCADIAN MISALIGNMENT PREDICT ADIPOSITY CHANGES OVER ONE YEAR IN ADULTS

Clarisa Medina-Poeliniz¹, Helen Burgess², Steven Carlson¹, Bradley Appelhans³, Laurreta Quinn⁴, Kelly Baron¹

¹University of Utah, ²University of Michigan, ³Rush University, ⁴University of Illinois Chicago

Introduction: Circadian timing and sleep alignment have been linked to metabolic dysfunction, yet few studies have examined whether within-person annual changes in dim light melatonin onset (DLMO) and alignment influence metabolic outcomes. This study examined whether annual change in DLMO timing and alignment predicted changes in metabolic markers

Methods: In this secondary analysis participants aged 18-65 with BMI > 25 (N = 89) completed two annual assessments including DLMO, 7-day actigraphy, and metabolic measurements (body fat %, BMI, waist-hip ratio, A1C). Circadian alignment was calculated as the duration between DLMO to sleep onset. Annual change variables were computed as Visit 5 (12-month follow-up) minus baseline. Baseline associations between DLMO and alignment were examined via linear regression. Additional linear regression

models tested whether annual changes in DLMO and alignment predicted one-year changes in adiposity and A1C, adjusting for age and sex.

Results: Participants (age 35.31 ± 9.76 years; 48.2% female) demonstrated an average DLMO shift of -0.35 minutes (SD = 50.5 minutes), indicating essentially no overall delay or advance in circadian phase across 12 months. In contrast, circadian alignment shifted earlier by an average of -1.04 hours (SD = 1.29 hours), reflecting earlier sleep timing relative to circadian phase. Annual change in alignment was initially associated with one-year BMI change; however, the association was not robust and became non-significant after removal of a high-influence observation. Annual change in DLMO did not significantly predict changes in BMI, waist-hip ratio, A1C, or body fat %. In the body fat model, sex ($B = -1.71$, $p = .029$) and age ($B = -0.09$, $p = .029$) were significant predictors.

Conclusion: Circadian timing and sleep-circadian alignment were closely related at baseline, and annual alignment shifts were associated with one-year BMI change. However, annual changes in circadian phase and alignment did not consistently predict other metabolic markers. These findings suggest that sleep-circadian alignment may play a role in weight trajectories, although further research is required to clarify these associations.

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0974

LVAD PUMP PARAMETERS AND PULMONARY VASCULAR RESISTANCE AS PREDICTORS OF OBSTRUCTIVE AND CENTRAL SLEEP APNEA SEVERITY

Amira Dalmazio, Huzaifa Wasanwala, Adrienne DaGue, Ricardo Concepción, Shaheryar Usman, Bindu Akkanti, Sriram Nathan, Calli Bertschy, Lilit Sargsyan, Reeba Mathew, Ruckshanda Majid
McGovern Medical School at University of Texas Health Science Center at Houston

Introduction: Sleep-disordered breathing (SDB), including both central and obstructive sleep apnea, is highly prevalent in advanced heart failure and may significantly influence hemodynamics in patients supported with continuous-flow left ventricular assist devices (CF-LVADs). Fluctuations in pump flow, speed, and pulsatility have been reported in association with untreated SDB, yet the impact and mechanism of this interaction remain unclear. As LVAD therapy expands, particularly as destination therapy, understanding cardiopulmonary predictors of SDB severity is crucial to optimize outcomes.

Methods: A retrospective analysis was performed on subjects supported by the same model of CF-LVAD who underwent a baseline in-laboratory polysomnography between January 2024 and February 2025 at Memorial Hermann Texas Medical Center. LVAD-specific parameters (such as pulsatility index), pulmonary vascular resistance (PVR) from right heart catheterization (RHC) when available, right ventricular systolic pressures, and the TRV-to-RVOT VTI ratio (an echocardiographic surrogate of PVR), obtained within 90 days of the polysomnography, were reviewed. All sleep studies were staged and scored using version V3 of the AASM scoring manual.

Results: 10 subjects were included for review; 70% were male, mean age 58.4 years (SD ± 10.1), mean BMI 33.6 kg/m² (SD ± 3.2), mean obstructive AHI 11.3 events/h (included 1B hypopneas), mean obstructive RDI 25.8 events/h (included 1A hypopneas), and the mean oxygen saturation nadir was 84.2%. The average central apnea index (CAI) was 1.1 events/h (SD ± 2.5), and 40% of subjects had Cheyne-Stokes respiration (CSR). In a univariate regression analysis, the pulsatility index ($p = 0.0003$) and pump flow ($p = 0.04$) were associated with the overall CAI. No significance was observed between pump speed, pump flow, pulsatility index, AHI, RDI, or the presence of CSR. Analyses involving PVR were also non-significant, possibly due to the small sample size.

Conclusion: Higher pulsatility index and LVAD pump flows were significantly associated with higher CAIs, while the AHI, RDI, and the presence of CSR demonstrated no meaningful relationship with pump flow, pump speed, pulsatility index, or PVR in this cohort. The PVRs from RHC and echocardiography were limited; additional studies with larger datasets are needed to determine whether PVRs contribute to the burden of SDB in patients with LVADs.

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0975

BEYOND ECG: ROBUST DEEP LEARNING-ENABLED ATRIAL FIBRILLATION DETECTION IN HSATS WITH PPG

Jan Wodnicki¹, Chris Fernandez¹, Yoav Nygate¹, Nick Glattard¹, Matt Sprague¹, Tom Vanasse¹, Fred Turkington¹, Sam Rusk¹, Krishna Sundar², Nathaniel Watson³

¹EnsoData Research, EnsoData, ²UC Davis Medical Center,

³University of Washington School of Medicine, Department of Neurology

Introduction: Atrial fibrillation (AFib) is a prevalent and often underdiagnosed comorbidity in patients with obstructive sleep apnea (OSA). Photoplethysmography (PPG) is widely available in PSG and home sleep apnea tests (HSAT), yet detection of AFib and atrial flutter (AFL) typically relies on electrocardiography (ECG). We developed and evaluated a deep learning model to detect AF events (AFib and AFL combined) from PPG signals, offering a scalable solution to implement high-accuracy, routine detection within large clinical sleep cohorts.

Methods: A total of $N=10,767$ studies with simultaneous ECG and PPG were randomly sampled from a large clinical PSG/HSAT database. Sampling was stratified uniformly across AFib burden to construct balanced training ($N=7,752$), validation ($N=1,938$), and test ($N=1,077$) datasets. AFib burden was estimated using a validated open-source ECG model and defined as the percentage of segments classified as AFib. Definitive AF labels were derived from a validated ECG analysis algorithm applied to a single-lead ECG II. A deep learning model was trained exclusively on PPG signals, and performance was evaluated on a per-epoch (30-second) basis on the test set. A total of 67,023 (7.5%) of the 30-second epochs in the test sample group were excluded due to insufficient PPG signal quality or artifacts.

Results: The PPG-based deep learning model achieved strong per-epoch AF (AFib/AFL) classification performance on the test dataset of 1,077 patients, which comprised 656,651 AF epochs and 173,579 non-AF epochs. The model achieved a ROC-AUC of 0.968,

sensitivity of 97.4%, and specificity of 91.3%. The corresponding positive predictive value (PPV) was 97.7%, and negative predictive value (NPV) was 90.3%.

Conclusion: The deep learning PPG model demonstrated robust detection of AF, achieving performance comparable to the gold-standard of ECG for AFib diagnosis. These findings highlight the potential to integrate automated AF detection into existing HSAT and PSG workflows, enabling scalable, high-accuracy arrhythmia screening in patients undergoing sleep studies without the need for additional hardware.

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0976

HYPGLOSSAL NERVE STIMULATION AND MAXILLOMANDIBULAR ADVANCEMENT: A COMPARISON OF CARDIOVASCULAR OUTCOMES IN OSA

Manan Shah, Rudra Amin, Robert Sataloff
Drexel University College of Medicine

Introduction: Treatment of obstructive sleep apnea (OSA) with maxillomandibular advancement (MMA) surgery has been found to improve cardiovascular outcomes in patients. Hypoglossal nerve stimulation (HNS) is a newer, less invasive procedure to treat OSA, with questions on cardiovascular outcomes remaining unanswered. This study evaluates whether HNS is non-inferior to MMA in preventing major adverse cardiovascular events (MACE) among patients with moderate-to-severe OSA.

Methods: This large-scale retrospective cohort study utilized the TriNetX Global Collaborative Network, analyzing anonymized electronic health records from approximately 185 million patients across 152 healthcare organizations. A total of 1,266 propensity score-matched OSA patients who underwent either HNS or MMA was included. Cohorts were observed at 1, 3, and 5 years post-treatment for the incidence of MACE outcomes (atrial fibrillation and flutter, cerebral infarction, acute myocardial infarction, transient cerebral ischemic attacks and related syndromes, and heart failure). Incidence of new-onset hypertension diagnosis and new hypertensive medication prescription also was analyzed.

Results: There was no significant difference in total MACE and hypertension outcomes between patients who received HNS compared to those who received MMA. However, cerebral infarction incidence was significantly higher in the HNS group at 3 and 5 years, while new hypertensive prescriptions were more frequent in the MMA group at 1 year.

Conclusion: These results suggest that there is no difference in cardiovascular outcomes in patients after receiving HNS or MMA. This may have implications for physician decision-making and treatment of moderate-to-severe OSA. Future studies with longer follow-up are needed to clarify whether these outcomes remain consistent and to assess further whether there is a difference

between these procedures in other outcomes related to OSA between these procedures.

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0977

IMPACT OF GUIDELINE-DIRECTED THERAPY ON THE PREVALENCE AND OUTCOMES OF SLEEP-DISORDERED BREATHING IN ACUTE HFREF IN RURAL APPALACHIA

Daniel LaPorte¹, Priya Srinivasan¹, Kassandra Olgers², Scott Knollinger¹, Sijin Wen¹, George Sokos¹, Mark Colantonio¹, Nicholas Borkowski¹, Sunil Sharma¹

¹West Virginia University, ²WVU Medicine Ruby Memorial Hospital

Introduction: Prior studies report a high prevalence (67–75%) of sleep-disordered breathing (SDB) among patients hospitalized with acute decompensated heart failure with reduced ejection fraction (HFrEF), with obstructive sleep apnea (OSA) comprising 57% and central sleep apnea (CSA) 18%. SDB has also been linked to increased 90-day readmission and mortality. However, with the widespread adoption of guideline-directed medical therapy (GDMT) over the past decade, the prevalence and clinical impact of SDB in this population may have shifted. This study evaluated the contemporary prevalence of SDB and its association with short-term outcomes in patients hospitalized with acute HFrEF.

Methods: Sixty-seven consecutive patients admitted with acute decompensated HFrEF underwent home sleep apnea testing (HSAT) as part of a clinical program. Patients were followed for 90 days to assess readmission and mortality. Demographics, comorbidities, and admission medications were recorded, including GDMT use. Fisher's exact test and logistic regression model were used to assess readmission and mortality in the statistical analysis.

Results: Among the 67 participants, 34 (51%) had SDB, with CSA present in 25 (37.3%) and OSA in 9 (13.4%). The cohort was predominantly male (68.7%), with a mean age of 63 years and mean BMI of 35 kg/m². Baseline characteristics did not differ significantly between the SDB and non-SDB groups. A total of 26 patients (38.8%) were receiving GDMT. There was no significant difference in 90-day cumulative readmission or mortality between patients with versus without SDB (32.4% vs. 67.6%; $p=0.218$). In logistic regression analysis, age >65 years and GDMT use were associated with higher 90-day readmission and mortality (OR 3.6 and 4.9, respectively), whereas OSA and CSA were not.

Conclusion: In the modern GDMT era, the prevalence of SDB among patients hospitalized with acute HFrEF appears lower than historically reported. Contrary to earlier studies, SDB was not associated with increased 90-day readmission or mortality. The higher event rates observed in patients on GDMT may reflect treatment allocation to a sicker subset rather than a causal relationship.

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0978

SCORES DERIVED FROM A DATA-DRIVEN SLEEP HEALTH FRAMEWORK SHOW STRONGER ASSOCIATIONS WITH CARDIOMETABOLIC RISK IN ADOLESCENTS

Cassandra Nyhuis¹, Susan Calhoun², Jason Liao³, Alexandros Vgontzas³, Edward Bixler³, Duanping Liao³, Julio Fernandez-Mendoza⁴

¹Johns Hopkins University, ²Penn State Health, ³Penn State College of Medicine, ⁴Penn State University, Hershey

Introduction: Sleep is increasingly recognized as vital for cardiometabolic health, yet most research focuses on single dimensions such as duration or quality. Multidimensional sleep health (MSH) captures multiple domains, providing a more comprehensive assessment. While adult studies show strong MSH-cardiometabolic health associations, evidence in adolescents is limited. We examined associations between MSH scores and metabolic syndrome (MetS), comparing our data-driven, multi-variable BEDReST framework to the established RU-SATED framework.

Methods: Data from 341 adolescents (16.3±2.2 yr; 47% female; 22.8% racial/ethnic minority) from the Penn State Child Cohort who completed in-lab polysomnography (PSG), ≥3 days of actigraphy (ACT), and sleep questionnaires were analyzed. Two multidimensional sleep health (MSH) scores were derived. The RU-SATED score (Regularity, Satisfaction, Alertness, Timing, Efficiency, Duration) combined ACT-derived sleep midpoint, efficiency, and total sleep time with self-reported insomnia and daytime sleepiness. The BEDReST framework (Breathing, Efficiency, Duration, Regularity, Satisfaction, Timing) incorporated 3 to 4 PSG, ACT, and self-report indicators per domain. For both scores, indicators were dichotomized using adolescent-specific cutoffs; BEDReST domain scores were averaged before summing, whereas RU-SATED domains were summed directly. Both scores ranged from 0 to 6, with higher values indicating better sleep health. Linear regression models examined associations between MSH scores and a continuous metabolic syndrome (cMetS) score, as well as components of waist circumference (WC), mean arterial pressure (MAP), HDL cholesterol, homeostatic assessment of insulin resistance (HOMA-IR), and triglycerides. All models were adjusted for age, sex, race/ethnicity, and socioeconomic status.

Results: BEDReST showed stronger inverse associations with cMetS than RU-SATED (BEDReST: $B = -0.43$, $p < 0.05$; RU-SATED: $B = -0.17$, $p > 0.05$) and was associated with lower WC ($B = -2.01$, $p < 0.05$), the primary driver of MetS, and marginally lower MAP ($B = -1.12$, $p = 0.05$); RU-SATED associations were non-significant (WC $B = -0.92$, $p > 0.05$, MAP $B = -0.41$, $p > 0.05$).

Conclusion: The data-driven BEDReST framework demonstrated stronger and more consistent associations with adolescent cardiometabolic risk than RU-SATED, particularly for waist circumference, a primary driver of metabolic syndrome. These findings highlight the value of comprehensive, multidimensional sleep assessment for identifying early cardiometabolic risk in adolescents.

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0979

ASSOCIATIONS OF SOLAR RADIATION WITH CARDIOVASCULAR HEALTH AMONG BLACK ADULTS

Zihao Wang¹, Nina L'Houtellier¹, Daniel Felipe Barba¹, Joon Chung¹, Azizi Seixas², Diana Grigsby³, Michael Grandner⁴, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³Brown University School of Public Health, ⁴University of Arizona

Introduction: Black American adults bear a disproportionate burden of hypertension and cardiovascular risk. Beyond traditional clinical and behavioral factors, environmental exposures may cause cardiovascular stress. Since solar radiation contributes to daytime thermal load and can influence vascular tone and autonomic regulation, patterns of sunlight and cloud cover may shape cardiovascular pathways relevant to sleep. We examined whether recent daytime solar exposure was associated with resting blood pressure in a cohort of Black American adults.

Methods: We analyzed data from 198 Black American adults (122 females, 76 males; mean age 50.7±14.1 years) from two NIH-funded studies 'ESSENTIAL' and 'MOSAIC'. Clinically measured systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) were treated as continuous outcomes. Daily solar exposures from the satellite-based NASA POWER project were linked to residential coordinates, focusing on indices that distinguished clearer, direct sunlit exposures from cloudier, more attenuated exposures. Specifically, we examined direct-beam sunlight, diffuse radiation, the direct-to-diffuse radiation ratio, and cloud cover. These solar parameters were averaged over the seven days preceding clinic visits to characterize recent daytime exposure. Linear regression models, adjusted for age, sex, sociodemographic factors, and BMI, examined associations between solar measures and each blood pressure outcome.

Results: Clearer, direct sunlit weeks were associated with higher resting DBP and MAP. Higher direct-beam sunlight and direct-to-diffuse ratios were associated with higher DBP and MAP (all $p \leq 0.04$; model $R^2 = 0.17-0.20$). In contrast, patterns indicating stronger cloud influence—greater cloud cover, and diffuse radiation—were associated with lower DBP and MAP (all $p \leq 0.03$; model $R^2 = 0.16-0.19$). Corresponding associations with SBP were weaker and did not reach statistical significance.

Conclusion: In this cohort of Black American adults, daytime solar exposures were related to cardiovascular health, indexed by resting blood pressure. Clearer, direct sunlit environments were associated with higher diastolic and mean arterial pressure, whereas cloudier, more attenuated exposures were related to lower levels. These findings support a thermal pathway linking daytime solar exposure to vascular regulation and highlight the daytime environment as relevant for sleep-related cardiovascular disparities.

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0980

BENZODIAZEPINE AND Z-DRUG USE IN ADULTS WITH OBSTRUCTIVE SLEEP APNEA AND CARDIOMETABOLIC COMORBIDITIES: A RETROSPECTIVE COHORT ANALYSIS

Alexandra Filipkowski¹, Priyanka Mehta¹, Jay Kavia¹,
Caroline O'Connor², Ariana Shaari¹

¹Rutgers New Jersey Medical School, ²Columbia University Mailman School of Public Health

Introduction: Benzodiazepines and Z-drugs are widely prescribed sedative-hypnotics that alter sleep architecture, blunt arousal responses, and may impair respiratory drive. Their use in patients with obstructive sleep apnea (OSA) is clinically concerning, particularly for individuals with cardiometabolic comorbidities who already face elevated cardiopulmonary risk. Despite widespread prescribing, real-world data on adverse outcomes associated with these medications in OSA populations remain limited. This study evaluated the association between benzodiazepine/Z-drug exposure and subsequent cardiopulmonary outcomes in adults with OSA and coexisting cardiometabolic disease (Smith et al., 2023).

Methods: We conducted a retrospective cohort study using de-identified electronic health records from 64 U.S. health-care organizations between July 2005 and July 2025. Adults with documented outpatient encounters and at least one cardiometabolic condition—hypertension, diabetes, or heart failure—were included. Individuals prescribed benzodiazepines or Z-drugs formed the exposure cohort; matched controls had no such prescriptions. Propensity score matching was performed on demographic factors and Charlson Comorbidity Index components. The primary outcomes included incident stroke, heart failure, acute respiratory failure, and all-cause mortality. Relative risks (RRs) and hazard ratios (HRs) were calculated, with age-stratified analyses conducted for robustness.

Results: The benzodiazepine/Z-drug cohort included 101,296 individuals (mean age 61.7 years), compared with 1,193,812 unexposed individuals (mean age 54.6 years). After matching, each cohort contained 98,219 adults. Benzodiazepine/Z-drug use was associated with higher risk of stroke (RR 0.93; 95% CI 0.89–0.99), heart failure (RR 1.10; 95% CI 1.06–1.14), and acute respiratory failure (RR 1.12; 95% CI 1.06–1.18). Mortality risk was also elevated (HR 1.468; 95% CI 1.42–1.51). Associations remained consistent across age groups.

Conclusion: In adults with OSA and cardiometabolic comorbidities, benzodiazepine or Z-drug use is associated with increased risk of adverse cardiopulmonary outcomes and mortality. These findings underscore the importance of cautious prescribing, heightened monitoring, and consideration of safer alternatives in this high-risk population.

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0981

BRIDGING SPECIALTIES: AN UPDATE ON AN INTEGRATED SLEEP MEDICINE-CARDIOLOGY SCREENING AND REFERRAL PROGRAM FOR SLEEP APNEA

Madeleine Basist, Laxminarayan Prabhakar, Vincent Dong,
Gabriel Hernandez Romero, Aron Soleiman, Sean Duenas,
Luis Quintero, Stella Hahn, Harly Greenberg, Ronald Wharton,
Annamaria Iakovou

Northwell Health

Introduction: An estimated 80% of patients with obstructive sleep apnea (OSA) remain undiagnosed. Our previous work established a high prevalence of OSA within our OSA screening program based in cardiology practices using the WatchPAT device. We describe updated outcomes from this program, specifically evaluating WatchPAT's arrhythmia detection feature, which can identify atrial fibrillation (AF) and premature beats to flag at-risk patients.

Methods: We conducted a retrospective analysis of 858 cardiology patients who underwent OSA screening with the Watchpat home sleep apnea test from 1/2024-1/2025. 846 patients were included for analysis. Results were analyzed for the overall cohort and stratified by WatchPAT arrhythmia detection (AD) status (+AD and -AD). Comorbidity prevalence was analyzed with a rank sum test, and apnea-hypopnea index (AHI) differences were analyzed with a t-test.

Results: OSA was detected in 74.62% of patients screened, with 39.89% diagnosed as moderate or severe. +AD average age was 64 years and BMI was 32 kg/m². -AD average age was 58 years and BMI was 32 kg/m². Comorbidities in each group were as follows: hypertension (+AD 69%, -AD 64.95%), AF (+AD 56.07%, -AD 17.59%, $p < 0.0001$), other arrhythmias (+AD 16.82%, -AD 12.58%), stroke (+AD 5.61%, -AD 2.98%), myocardial infarction (+AD 0.93%, -AD 2.44%), heart failure (+AD 7.48%, -AD 5.55%), PCI/CABG (+AD 14.02%, -AD 5.55%), and coronary artery disease (+AD 19.63%, -AD 15.70%). The OSA severity distribution in +AD was normal (18.1%), mild (28.71%), moderate (26.73%), and severe (25.74%) and in -AD was normal (26.30%), mild (35.69%), moderate (23.70%), and severe (14.31%). +AD mean AHI was 24.36 and -AD mean AHI was 14.79 ($p < 0.0001$). Notably, +AD had a higher prevalence of cardiac comorbidities and a higher degree of OSA (moderate to severe OSA incidence of 52.47% +AD, 38.00% in -AD) ($p < 0.0018$).

Conclusion: These results reinforce the high prevalence of OSA, particularly moderate to severe OSA, in this cardiology-based OSA screening program. The higher prevalence of moderate to severe OSA in +AD patients suggests a possible association between arrhythmias and higher OSA disease burden. WatchPAT's arrhythmia detection flagged undiagnosed arrhythmias in 43.93% of +AD patients, highlighting its potential to identify the need for further cardiac evaluation.

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0982

COMORBIDITY PATTERNS THAT SIGNAL POTENTIAL OSA RISK: PREVALENCE ACROSS DIAGNOSTIC STATUS

Shuying Yu¹, Elaine Lee², Kimberly Sterling¹, Leanne Kaye¹

¹Resmed Science Center, ²Resmed

Introduction: Patients with and without obstructive sleep apnea (OSA) often present with similar comorbid conditions, yet the extent to which comorbidity patterns differ between groups remains unclear. This study compares comorbidity type and prevalence among individuals with and without an OSA diagnosis, and how outcomes differ by sex.

Methods: In 2024, U.S. adults completed an online survey about their general health, OSA status, and physician-diagnosed comorbidities. Participants were classified to a diagnostic group based

on self-reported OSA diagnosis and OSA symptoms: (1) asymptomatic but predisposed to OSA ($n = 120$), (2) symptomatic without a confirmed OSA diagnosis or treatment ($n = 182$), and (3) diagnosed with OSA ($n = 607$; including never, past, and current PAP (positive airway pressure) therapy users). Descriptive analyses identified the three most prevalent non-OSA comorbidities in each diagnostic group, including sex differences.

Results: A total of 909 participants were included in the analysis (mean age: 53 years; 58% female; 67% with OSA). Overall, hypertension (482/909, 53%), hypercholesterolemia (312/909, 34%), and depression (249/909, 27%) were the most commonly reported comorbidities, with women (vs. men) more frequently reporting depression (264/523, 50% vs. 52/386, 13%), and men (vs. women) more frequently reporting hypercholesterolemia (152/386, 39% vs. 110/523, 21%). Hypertension prevalence was similar across the symptomatic non-OSA group and OSA group (90/182, 49% vs. 304/607, 50%), but rates of hypercholesterolemia and depression were almost double in the symptomatic non-OSA group compared to the OSA group (hypercholesterolemia: 94/182, 52% vs. 144/607, 24%; depression: 89/182, 49% vs. 160/607, 26%, respectively). Participants in the asymptomatic non-OSA group showed the highest prevalence for hypertension (88/120, 73%) and hypercholesterolemia (74/120, 62%) compared to the symptomatic non-OSA group and OSA group. Women in the symptomatic non-OSA group and OSA group had similar rates of depression (74/136, 54% vs. 190/314, 61%).

Conclusion: Symptomatic participants without a confirmed OSA diagnosis had similar comorbidity patterns to those with OSA. Hypertension, hypercholesterolemia, and depression may serve as useful indicators of potential sleep-related health issues. Understanding overlapping comorbidities can help healthcare providers recognize when commonly reported conditions may reflect unrecognized OSA risk, supporting earlier screening and proactive discussions about sleep health.

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0983

DESCRIPTIVE CHARACTERISTICS OF SLEEP CLINIC PATIENTS IN A CARDIOVASCULAR INSTITUTE WITH PREDOMINANTLY HISPANIC POPULATION

Masood Azhar¹, Yanjia Zhang¹, Anshul Saxena¹, Venkataraghavan Ramamoorthy¹, Wendy Cardenas¹, Raul E. Herrera², Harneet Walia¹

¹Baptist Health South Florida, Inc., ²Miami Cardiac and Vascular Institute

Introduction: Sleep is fundamental for cardiometabolic health, and disruptions in sleep patterns have emerged as growing public health concerns. This study examines the demographic characteristics and comorbid burden among sleep clinic patients within a cardiovascular institute in South Florida enriched with Hispanic population.

Methods: We conducted a retrospective analysis of data from sleep study at Baptist Health South Florida from March 2021 to June 2025. Demographic characteristics, sleep duration, and comorbidities were assessed. Patients were categorized into three groups based on sleep duration: short (< 7 hours), normal (7-9 hours), and long (>9 hours). Chi-square and Kruskal-Wallis tests were used to evaluate the differences in proportions and medians.

Results: A total of 5983 patients were included in our study. Among them, 55.3% were male, and 46.6% were Hispanic. Median age at presentation was 58 years, and median BMI was 31.4. Moreover, 25% of patients were current or former smokers. Median sleep duration was 7 hours, median sleep latency was 10 minutes, and median sleep irregularity was 0 hours. 2765 (46.2%) patients had stage 1 or above hypertension, and 147 (2.5%) patients had atrial fibrillation (A-Fib). There were 2990 patients in the short sleep duration group, 2808 in the normal duration group, and 185 in the long duration group. There were a greater proportion of men with shorter duration of sleep compared to women (54.3% vs 45.7%). Among Hispanics, 50.89% had short, 46.05% had normal, and 3.05% had long sleep duration. Among non-Hispanics, 49% had short, 47.7% had normal, and 3.1% had long sleep duration. The proportion of patients with A-Fib differed significantly between the three groups (short: 2%, normal: 2.7%, and long: 4.9%, $P=0.018$).

Conclusion: In our cohort of cardiovascular patients with substantial Hispanic representation, there were differences in sleep duration based on demographics and comorbid conditions. Future studies should further explore these differences to have a better understanding of sleep disturbances in this cohort.

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0984

DO GLUCAGON-LIKE PEPTIDE-1 AGONISTS IMPROVE SLEEP? EVIDENCE FROM A NATIONALLY REPRESENTATIVE SAMPLE OF ADULTS IN THE UNITED STATES

Marie-Rachelle Narcisse¹, Fatima Cody Stanford², Kiara Medeiros³, David Barker¹

¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²Neuroendocrine Unit, Boston Area Nutrition Obesity Research Centre, MGH Weight Center, Department of Medicine and Pediatrics, Massachusetts General Hospital, Harvard Medical School, ³E.P. Bradley Hospital Sleep Research Laboratory

Introduction: Glucagon-like peptide-1 agonists (GLP-1) are widely prescribed for obesity and type-2 diabetes. These medications may also influence sleep through metabolic and neuroendocrine pathways. Small clinical trials in the United States (US) have reported improved self-reported sleep quality with GLP-1 use. However, population-level links between GLP-1 therapy and sleep health across body mass index (BMI) categories remain unclear.

Methods: We analyzed data from the 2024 National Health Interview Survey, a representative sample of US adults aged ≥ 18 years, to examine associations between self-reported GLP-1 use among adults with prediabetes/diabetes and multiple sleep health indicators across BMI categories. Outcomes included: self-reported sleep duration (categorized as very short [≤ 4 hrs], short [5-6hrs], healthy [7-9hrs if 18-64 years; 7-8hrs if ≥ 65 years], and long [≥ 10 hrs if 18-64 years; ≥ 9 hrs if ≥ 65 years]); trouble falling asleep; trouble staying asleep; and sleep restfulness (four responses: never; some days; most days; every day in the past 30 days). Weighted regression models with interaction terms for GLP-1 $\times$ BMI (healthy weight, overweight, obesity classes 1-3) and covariates (age, sex, race/ethnicity, marital status, education, employment, place of birth, and poverty) were estimated.

Results: Of 7,322 participants, 16% used GLP-1 medications. Among these users, 3% had very short sleep duration, 29% had short sleep duration, 60% had healthy sleep duration, and 8% had

long sleep duration. Trouble falling asleep was reported by 38% (some days), 13% (most days), and 9% (every day). Trouble staying asleep was reported by 34% (some days), 15% (most days), and 13% (every day). An interaction between GLP-1 use and BMI was observed among very short sleepers ($F_{1,604}=6.82$, $p<0.01$), indicating that the probability of very short sleep duration was less frequent among GLP-1 users with increasing BMI, but not among non-users. Another interaction was found between GLP-1 use and BMI for those who woke up rested “some days” ($F_{1,609}=4.55$, $p<0.05$). No interactions were seen for other outcomes.

Conclusion: GLP-1 therapy may reduce the risk of very short sleep duration among individuals with higher BMI. These results show a need for tailored sleep interventions among GLP-1 users, especially those with higher BMI.

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0985

EXCESSIVE DAYTIME SLEEPINESS AND PREVALENT AND INCIDENT HYPERTENSION: THE MODIFYING EFFECT OF OBJECTIVE SLEEP DISTURBANCE

Slobodanka Pejovic¹, Alexandros Vgontzas¹, Nikolaos Athanasiou¹, Julio Fernandez-Mendoza², Yun Li³, Georgia Trakada⁴, Edward Bixler¹
¹Penn State College of Medicine, ²Penn State University, Hershey, ³Shantou University Medical College, ⁴National and Kapodistrian University of Athens Medical School

Introduction: Excessive daytime sleepiness (EDS) has been linked to adverse cardiovascular outcomes. In this study we examined whether the relationship between EDS and the risk of hypertension in a large random general population sample is modified by objective polysomnography derived markers of sleep disturbance. **Methods:** Prevalent and incident hypertension was calculated from the 1741 adults of the Penn State Adult Cohort at baseline, and 786 subjects without hypertension who were followed-up for an average of 7.5 years respectively. EDS was defined based on a report of moderate-to-severe daytime sleepiness/drowsiness and/or irresistible sleep attacks at baseline or at follow-up. All subjects underwent 8-hour polysomnography. Prolonged sleep-onset latency (SL ≥ 30 minutes) during overnight polysomnography served as an index of sleep disturbance/hyperarousal. Prevalent hypertension was defined by systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg, or antihypertensive treatment. Incident hypertension was determined by diagnosis or self-reported antihypertensive treatment. We created four mutually exclusive groups: no EDS and SL < 30 minutes as the reference group; no EDS and SL ≥ 30 minutes; EDS and SL < 30 minutes; and EDS and SL ≥ 30 minutes. In logistic regression analysis we adjusted for sex, baseline age, BMI, race/ethnicity, smoking, caffeine use, alcohol use, diabetes, depression, apnea/hypopnea index, total sleep time, wake time after sleep onset, and sampling weight; in addition, longitudinal logistic regression models also adjusted for follow-up duration.

Results: Individuals reporting EDS demonstrated higher odds of both prevalent and incident hypertension compared with normal controls (OR:1.52; 95%CI:1.01-2.27; $p=0.044$; OR:1.74; 95%CI:1.05-2.87; $p=0.030$, respectively). The combination of EDS with objectively prolonged SL conferred a twofold increase in prevalent (OR:2.34; 95%CI:1.18-4.63; $p=0.015$) or incident hypertension (OR:3.43; 95%CI:1.58-7.41; $p=0.002$) compared to normal controls.

Conclusion: These findings indicate that prolonged SOL may represent a useful marker of a prevalent EDS subgroup, associated with hyperarousal. Recognizing this phenotype may lead to more accurate clinical diagnosis and targeted therapeutic approaches which is the goal of personalized medicine.

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0986

HOME SLEEP APNEA TEST (HSAT) FACTORS DRIVING AFIB RISK: IS SLEEP QUALITY MORE IMPORTANT THAN OSA SEVERITY OR HYPOXEMIA?

Jan Wodnicki¹, Chris Fernandez¹, Yoav Nygate¹, Nick Glattard¹, Tom Vanasse¹, Matt Sprague¹, Fred Turkington¹, Sam Rusk¹, Krishna Sundar², Nathaniel Watson³

¹EnsoData Research, EnsoData, ²UC Davis Medical Center,

³University of Washington School of Medicine, Department of Neurology

Introduction: Obstructive sleep apnea (OSA) and atrial fibrillation (AFib) have a well established relationship, sharing many common risk factors such as sex, age, obesity, diabetes. The two conditions are highly co-prevalent: 10.5% of patients with OSA have AFib and 45.9% of patients with AFib have OSA. This work examines the relationship between markers of OSA severity and sleep quality with AFib burden in a large, representative clinical sleep cohort.

Methods: N=526,523 Type IV home sleep apnea tests (HSAT) with 4-12 hours of photoplethysmography (PPG) recording were analyzed. A deep learning model was applied to classify AFib epoch-by-epoch then compute a subject-level AFib Burden. Respiratory instability measures (apnea-hypopnea index (AHI), oxygen-desaturation index (ODI), hypoxic-burden index (HBI)), hypoxemia measures (SpO2 time-under 95% (T95), 90% (T90), 85% (T85)), sleep quality and disturbance measures (sleep efficiency (SE), total sleep time (TST), awakenings after sleep onset (AASO), sleep fragmentation index (SFI; stage transitions count), heart rate variability (HRV) and demographics were extracted. Univariate logistic regression quantified association between each predictor and AFib; odds ratios (ORs) and 95% confidence intervals are reported, with ORs for continuous predictors representing the change per standard deviation.

Results: OSA severity indices were significantly associated with AFib. The strongest associations (ORs) for respiratory instability were AHI4% (1.20, 1.19–1.22), AHI3% (1.19, 1.17–1.21), ODI4% (1.16, 1.15–1.18), HBI4% (1.14, 1.13–1.16), HBI3% (1.14, 1.13–1.15), and ODI3% (1.14, 1.12–1.15). Hypoxemia measures showed weaker associations: T85% (1.07, 1.05–1.08) and T80% (1.03, 1.01–1.04). Sleep quality measures were more strongly associated with AFib than OSA severity. Sleep efficiency (0.69, 0.68–0.70) and total sleep time (0.77, 0.75–0.78) were protective, while awakenings after sleep onset (1.26, 1.25–1.27) and sleep fragmentation (1.17, 1.15–1.18) indices were positively associated. HRV during sleep (3.52, 3.47–3.56) and during wake (3.57, 3.52–3.62) was strongly associated. Female sex was protective (0.59, 0.57–0.61) whereas age increased risk (2.44, 2.37–2.52).

Conclusion: OSA severity and sleep fragmentation measures showed significant and moderately strong associations with AFib, highlighting OSA's role as an important risk factor. Unexpectedly, sleep quality measures demonstrated stronger associations than

measures of respiratory instability and hypoxemia. These findings have direct clinical relevance and implications when discussing AFib risk with patients undergoing sleep studies.

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0987

INDEPENDENT EFFECTS OF MULTIPLE SLEEP DISORDERS ON CARDIOMETABOLIC DISEASE: EVIDENCE FROM A COSTA RICAN CLINICAL COHORT

Lilliana Estrada-Chaverri¹, Lourdes DelRosso²,
Fernando Ceballos-Fuentes³

¹Sleep Med Sleep Disorders Medical Center, ²University of California San Francisco, Fresno, ³Neurology and Sleep Guatemalan Center

Introduction: Introduction: Multiple sleep disorders frequently coexist and may jointly contribute to cardiometabolic risk. However, the independent effect of accumulating sleep disorders on hypertension (HTN) and type 2 diabetes (DM2) is not well understood. This study evaluated the prevalence of common sleep disorders, quantified the burden of coexisting disorders, and assessed their associations with HTN and DM2 in models adjusted for age, sex, and body mass index (BMI).

Methods: Methods: Cross-sectional analysis of polysomnography from 3,154 Costa Rican adults. Insomnia, restless legs, parasomnia, bruxism, and obstructive sleep apnea (OSA; apnea-hypopnea index >5 events/hour), were summed to create a sleep disorder burden score (0, 1, 2, or ≥3 disorders). HTN and DM2 were identified using cardiovascular risk documentation. Primary logistic regression models were adjusted for age and sex, while secondary models further adjusted for BMI. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated.

Results: Results: The sample included 1,466 women (48.1%) and 1,589 men (50.4%). Prevalence of individual disorders was 3.4% for insomnia, 10.8% for restless legs, 9.4% for parasomnia, 6.2% for bruxism, and 80.6% for OSA. Based on the five-disorder burden, 17.6% had 0 disorders, 65.0% had 1 disorder, 11.4% had 2 disorders, and 6.0% had ≥3 disorders. Crude prevalence of HTN rose from 32.2% in those with 0 disorders to 54.1%, 58.8%, and 64.7% for 1, 2, and ≥3 disorders; DM2 increased from 15.5% to 27.5%, 29.5%, and 35.3%, respectively. In BMI-adjusted models, sleep disorder burden remained strongly associated with HTN: 1 disorder (adjusted OR [aOR] 1.50, 95% CI 1.18–1.91), 2 disorders (aOR 1.81, 95% CI 1.32–2.49), and ≥3 disorders (aOR 2.65, 95% CI 1.78–3.95). For DM2, BMI adjustment attenuated associations; however, ≥3 disorders remained significant (aOR 1.86, 95% CI 1.22–2.83), while 1 and 2 disorders showed nonsignificant trends. Age and BMI were strong independent predictors of both outcomes.

Conclusion: Conclusions: Accumulation of sleep disorders was strongly associated with hypertension and, to a lesser degree, type 2 diabetes, with the greatest risk observed in patients with three or more disorders.

Support (if any): Any

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0988

INSOMNIA AND COMISA ARE KEY DRIVERS OF NOCTURNAL GLYCEMIC VARIABILITY IN WELL-CONTROLLED T2DM: INSIGHTS FROM MULTI-NIGHT SLEEP AND CGM MONITORING

Hai Ka Betty Young¹, Chak Yan Isaac Kwok², Pui Sze Grace Hui¹,
Ka Shing Yan¹, Yin San Florence Wong¹, Man Chi Wong¹,
Lydia Leung³, Cynthia Cheung³, Chih-Wei Tsai³

¹Tung Wah Eastern Hospital, Hong Kong, ²Hospital Authority, Hong Kong, ³Belun Technology Company Limited

Introduction: Glycemic variability (GV) independently predicts diabetic complications, with fluctuations promoting oxidative stress, inflammation, and endothelial dysfunction. Insomnia and obstructive sleep apnea (OSA) are highly prevalent in Type 2 Diabetes (T2D) and may exacerbate metabolic dysregulation, but their impact on nocturnal GV in treated patients with apparently stable glycemic control remains unclear. This study evaluated whether insomnia, OSA, and their co-occurrence (COMISA) have distinct nocturnal GV profiles in a real-world cohort of well-controlled T2D.

Methods: Fifty-nine patients with T2D (median age 62.0 years) underwent up to 15 consecutive nights of continuous glucose monitoring (CGM; Abbott Libre 2) paired with objective sleep assessment via Belun Ring (BR). Participants were classified as OSA (BR-AHI3% ≥15; N=19), insomnia (BR sleep efficiency < 80% with intake interview; N=11), or COMISA (meeting criteria for both disorders; N=29). Nocturnal GV was quantified using sleep-time coefficient of variation (SLP-CV) and sleep-time continuous overall net glycemic action (SLP-CONGA). Groups differences in median GV were tested, followed by generalized linear mixed-effects models (GLMMs) adjusted for age, sex, BMI, and HbA1c, incorporating participant-level random intercepts to account for night-to-night variability.

Results: COMISA and insomnia exhibited higher SLP-CV (12.3% and 13.3%) than OSA (8.9%, both $p < 0.05$), despite comparable glycemic control across groups (median HbA1c 7.3 vs 7.2% vs 7.1% for COMISA, insomnia, and OSA; $p=0.81$; 83% on metformin; 19% on insulin). Males exhibited higher nocturnal GV than females for both SLP-CV ($p=0.07$) and SLP-CONGA ($p < 0.05$). In adjusted GLMMs, COMISA was associated with a 39% increase in nocturnal SLP-CV ($\beta=0.33$, $p < 0.05$) and insomnia with a 43% increase ($\beta=0.36$, $p < 0.05$) compared with OSA. Moreover, male sex ($\beta=0.24$, $p < 0.05$) and a higher REM% ($\beta < 0.01$, $p < 0.05$) were independently associated with higher SLP-CV.

Conclusion: This pioneering study identifies Insomnia and COMISA as independent drivers of elevated nocturnal GV in pharmacologically treated T2D, a metabolic risk factor linked to microvascular and macrovascular complications that is not reflected by HbA1c. Multi-night CGM integrated with sleep monitoring reveals hidden nocturnal metabolic instability, suggesting T2D patients with insomnia-related phenotypes and male sex, represent a high-risk subgroup who may benefit from personalized sleep and metabolic interventions.

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INTEGRATING PRE-STROKE STOP-BANG RISK AND EARLY BULBAR SIGNS TO PRIORITIZE OSA SCREENING IN ACUTE ISCHEMIC STROKE

Hee-Jin Im¹, Byoungchul Choi², Yoo-Ha Hong¹¹Dongtan Sacred Heart Hospital, Hallym University Medical Center, ²Hallum University Chuncheon Sacred Heart Hospital

Introduction: Obstructive sleep apnea (OSA) is common in acute ischemic stroke and may worsen secondary brain injury through hypoxia-driven autonomic and endothelial mechanisms. Although pre-stroke STOP-Bang scores can identify individuals at high baseline OSA risk, screening and treatment are often delayed due to acute-phase clinical limitations. Early bedside neurological features—particularly dysarthria and dysphagia—may further distinguish patients who require urgent OSA evaluation and intervention. This study aimed to assess whether early bulbar symptoms provide additional risk stratification value in STOP-Bang-predicted high-risk stroke patients, supporting a workflow for accelerated OSA screening and timely management.

Methods: We retrospectively analyzed 149 adults presenting with acute ischemic stroke within 5 days of symptom onset (November 2021–October 2023). All patients completed STOP-Bang assessment at admission, and those scoring ≥ 3 underwent attended in-laboratory polysomnography within 7 days of stroke onset. Patients with predominant central sleep apnea were excluded. Bulbar involvement (dysphagia/dysarthria) was classified as: none, mild symptom, or severe involvement based on clinical and three-swallow bedside dysphagia screening assessment at the study night. OSA prevalence and severity based on apnea hypopnea index(AHI) were compared across groups.

Results: Among the participants (mean age 60.3 ± 12.5 years, 69.8% male, BMI 25.2 ± 4.0), increasing bulbar impairment correlated with higher OSA burden. The positive predictive value for moderate OSA was 69.4%, 80.7%, and 100%, and for severe OSA 36.7%, 51.6%, and 85.7%, respectively. Mean AHI increased stepwise (26.8, 33.2, 56.8 events/h) in parallel with neurological severity.

Conclusion: In acute ischemic stroke patients with elevated pre-stroke STOP-Bang risk, early bulbar symptoms serve as a pragmatic bedside marker to prioritize OSA screening. This stratified model supports a clinically feasible pathway for rapid identification and earlier intervention, particularly where diagnostic capacity or PAP tolerance is restricted. Prospective validation is warranted to determine whether risk-guided, early OSA management improves neurological recovery and long-term outcomes.

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0990

IS THERE AN ASSOCIATION BETWEEN POOR SLEEP PATTERNS AND THE OCCURRENCE OF MINOR ADVERSE EVENTS DURING EXERCISE IN CARDIAC REHABILITATION PROGRAMS?

Heloisa Valente¹, Priscila Morelhão², Rafael de Santana³, Alice Moliterno¹, Júlio César Soares¹, Felipe Ribeiro¹, Maria Júlia Laurino¹, Francis Pacagnelli⁴, Diego Giulliano Christofaro¹, Sergio Tufik⁵, Monica Andersen⁶, Luiz Carlos Vanderlei¹

¹Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), ²Instituto do Sono, Associação Fundo de Incentivo à Pesquisa, ³Universidade Estadual de Londrina (UEL), ⁴Universidade do Oeste Paulista (UNOESTE), ⁵Universidade Federal de São Paulo, ⁶Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Sleep assessment has been recommended as part of risk stratification and management of patients enrolled in cardiac rehabilitation programs (CRP). Poor sleep patterns have been associated with unfavorable outcomes. However, the relationship between sleep characteristics in CRP participants and the occurrence of complications during exercise remains unclear. Although CRP is considered safe, patients can experience minor events, such as angina. These episodes reflect exercise intolerance and could signal an increased risk of major cardiac events, for example, myocardial infarction. Understanding these connections may help guide exercise prescription and monitoring strategies, and improve patient safety. This study aimed to investigate whether there is a relationship between the sleep patterns of CRP patients and the appearance of minor events during exercise.

Methods: Ethical approval was granted (CAAE: 35831220.8.0000.5402). Individuals from CRP were included in the study. Volunteers wore a triaxial accelerometer on their non-dominant wrist for 7 days to assess sleep. Raw accelerometer data was processed using the GGIR package in R, and analyses were performed only for individuals with at least 5 valid days (≥ 16 hours/day). Sleep parameters of interest were sleep duration, sleep efficiency and wake after sleep onset (WASO). Minor events (angina, cramp, dizziness, increased systolic (>200 mmHg) and/or diastolic (>120 mmHg) blood pressure during exercise, fatigue, muscle pain, nausea and pallor) were recorded across 24 exercise sessions by trained therapists. Overdispersed Poisson regression was used, considering ≥ 6 hours of sleep, WASO ≤ 40 minutes, and sleep efficiency $\geq 85\%$ as reference categories.

Results: The sample was composed of 89 participants (69.71 ± 9.92 years). No significant associations were found between sleep duration (IRR=0.555 [95%CI=0.272-1.08]; $p=0.09$), WASO (IRR=1.13 [95%CI=0.458-3.59]; $p=0.81$) and sleep efficiency (IRR=0.578 [95%CI=0.257-1.19]; $p=0.16$) with events during exercise.

Conclusion: Poor sleep patterns were not related to the manifestation of minor events during exercise in CRP. Despite these findings, sleep screening remains essential, as inadequate sleep is linked with worse outcomes in individuals with cardiovascular disease, including mortality and recurrent cardiac events. Research employing additional assessment methods is warranted.

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0991

NARCOLEPSY AND IN-HOSPITAL OUTCOMES FOLLOWING ACUTE MYOCARDIAL INFARCTION: A NATIONAL INPATIENT SAMPLE STUDY

Pedro Arias, Puja Bhardwaj
SBH Health System

Introduction: Narcolepsy has been associated with increased cardiovascular and cardiometabolic risk. However, limited data exist

regarding its impact on acute coronary artery disease, particularly ST-elevation myocardial infarction (STEMI).

Methods: Using the National Inpatient Sample (NIS) database from 2016–2021, we identified adults (≥ 18 years) hospitalized with a primary diagnosis of STEMI (ICD-10: I21.0–I21.3). Patients were stratified by the presence of narcolepsy (ICD-10: G47.41, G47.419). Outcomes of interest included in-hospital mortality, length of stay (LOS), and total hospitalization charges. Multivariable logistic and linear regression models were used to evaluate associations, adjusting for age, sex, race, primary payer, comorbidities, and year.

Results: Narcolepsy was present in 100 patients (0.04%). Compared with patients without narcolepsy, those with narcolepsy had lower in-hospital mortality (7.0% vs. 11.1%), shorter LOS (4.1 vs. 4.7 days), and lower total charges (\$98,571 vs. \$127,407), although none of these differences were statistically significant. In adjusted analyses, narcolepsy was not significantly associated with in-hospital mortality (OR 0.69; 95% CI 0.32–1.48; $p=0.340$), LOS ($\beta -0.50$ days; 95% CI -1.32 to 0.31 ; $p=0.226$), or hospitalization charges (-2% on average; 95% CI -15% to $+11\%$; $p=0.739$).

Conclusion: Narcolepsy was not independently associated with in-hospital mortality, LOS, or hospital costs after adjustment for clinical and demographic factors. These findings suggest that, despite the known long-term cardiometabolic risks associated with narcolepsy, its presence does not appear to worsen short-term outcomes during acute myocardial infarction.

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QUANTIFYING DIRECT AND INDIRECT PATHWAYS LINKING POOR SLEEP HEALTH TO HYPERTENSION RISK

Wensu Zhou, Symielle Gaston, Dale Sandler, Chandra Jackson
National Institute of Environmental Health Sciences

Introduction: Poor sleep health may increase hypertension risk directly through, for instance, non-dipping and indirectly by exacerbating other modifiable, more traditional risk factors such as physical inactivity and consumption of alcohol along with an unhealthy eating pattern. However, the indirect contribution of these lifestyle medicine pillars remains poorly quantified, although quantification can help identify targets offering the most harm reduction.

Methods: Using longitudinal data from the Sister Study (enrollment [2003–2009] to follow-up [2018–2019]), we assessed self-reported dimensions of poor sleep health (short sleep duration, irregularity, sleep debt, frequent napping, insomnia symptoms, and a cumulative poor sleep score) and other lifestyle medicine pillars (smoking, alcohol consumption, physical activity, diet, and stress) at enrollment. Participants reported physician-diagnosed incident hypertension over a median 11-years of follow-up. Cox proportional hazards models both estimated hazard ratios (HRs) and 95% confidence intervals (CIs) and assessed the indirect effects of sleep characteristics on hypertension via individual lifestyle medicine pillars and via all pillars simultaneously.

Results: Among 25,825 women (mean age: 53.8 years [$SD=8.9$]) without hypertension at enrollment, 7,547 developed hypertension. All sleep dimensions were associated with hypertension risk, ranging from a 6% higher risk (HR=1.06; 95% CI: 1.00–1.12) for

sleep debt to a 16% higher risk (HR=1.16; 95% CI: 1.10–1.22) for insomnia symptoms. Further, former smoking, current smoking, physical inactivity, and unhealthy diet were significant single mediators for most associations between unfavorable sleep characteristics and hypertension. Alcohol consumption and stress did not mediate associations. Simultaneous lifestyle pillars collectively explained 12% (95% CI: 2%–29% for short sleep) to 34% (95% CI: 17%–156% for sleep debt) of the associations with unhealthy diet explaining the most (up to 13% [95% CI: 5%–69%]) while current smoking explained the least (up to 6% [95% CI: 2%–20%]).

Conclusion: Poor sleep health in relation to hypertension risk may be partly explained by other lifestyle medicine pillars among US women. Multifactorial and multi-component interventions targeting smoking, physical activity, and diet along with multiple dimensions of sleep may more effectively aid in reducing the burden of hypertension among U.S. women while pathways involving alcohol use and stress require further study.

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0993

SLEEP DISORDERS AS A MEDIATOR OF THE ASSOCIATION BETWEEN PTSD/MDD AND CARDIOVASCULAR DISEASE IN VETERANS REFERRED FOR CBT-I

Isabella Soreca, Faith Luyster, Mark Thomas
Pittsburgh VA Healthcare System

Introduction: Sleep disturbances are hallmark symptoms of psychiatric conditions, but also independent risk factors for adverse cardiovascular outcomes. Utilizing a clinically complex cohort of Veterans enriched with sleep disturbances, we sought to examine the association between psychiatric diagnoses (specifically major depressive disorder (MDD) and/or post-traumatic stress disorder (PTSD) and cardiometabolic disease and test the hypothesis that the presence of a comorbid sleep diagnosis (e.g., insomnia, obstructive sleep apnea (OSA) mediates this relationship.

Methods: Data were obtained from the Veterans Affairs (VA) Corporate Data Warehouse for all Veterans who had initiated at least one session of cognitive-behavioral therapy for insomnia as documented in their medical record, between 10/01/2015 and 06/15/2023. Medical and psychiatric comorbidities were assessed using diagnostic codes from ICD-9 and ICD-10.

Results: We used data from 83,494 veterans with complete diagnostic information. The mean age was 50.89 ± 15.26 years, with a range of 18–89 years. The cohort was predominantly male (82.7%). The most prevalent conditions were OSA (55.1%) and heart disease (41.2%). PTSD and MDD were each associated with increased odds of cardiometabolic disease. Approximately 24% (95% CI 20–28%) of PTSD's effect on cardiometabolic disease was mediated by sleep disorders. Similarly, MDD (ACME = 0.018, ADE = 0.058, total effect = 0.076) showed 24% (95% CI 19–28%) of the association mediated. Stratified analyses showed that mediation effects were stronger in Veterans under age 50. Network analysis confirmed clustering of cardiometabolic conditions (hypertension, diabetes, obesity, OSA, heart disease) and trauma-mood-sleep disorders (PTSD, depression, anxiety, insomnia), with OSA and obesity acting as bridges between psychiatric and medical domains.

Conclusion: This study demonstrates that sleep disorders partially mediate the relationship between PTSD, depression, and cardiometabolic disease in a large Veteran cohort. Both psychiatric conditions were associated with cardiometabolic outcomes, and approximately one-quarter of this effect was through sleep disorders. The findings suggest that sleep represents a meaningful pathway linking psychiatric illness to cardiometabolic risk, particularly in younger adults.

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SLEEP REGULARITY AND RISK OF INCIDENT HYPERTENSION IN THE UK BIOBANK

Kaitlin S. Potts¹, Sina Kianersi¹, Tariq Faquih¹, Raymond Noordam², Martin Rutter³, Tamar Sofer⁴, Sean Cain⁵, Daniel Windred⁵, Angus Burns⁶, Andrew Phillips⁷, Susan Redline¹, Heming Wang¹, Tianyi Huang⁸

¹Brigham and Women's Hospital and Harvard Medical School, ²Leiden University Medical Center, ³Diabetes, Endocrinology and Metabolism Centre, Manchester Royal Infirmary, Manchester University NHS Foundation Trust, NIHR Manchester Biomedical Research Centre, Manchester Academic Health Science Centre, ⁴Cardiovascular Division, Department of Medicine, Beth Israel Deaconess Medical Center, ⁵Flinders Health and Medical Research Institute (Sleep Health), Flinders University, ⁶Harvard Medical School, ⁷College of Medicine and Public Health, Flinders University, ⁸National Institute of Aging

Introduction: Irregular sleep schedules are common and have been linked to increased cardiovascular disease (CVD) risk. Hypertension affects nearly a third of adults and is the leading modifiable cause of CVD, but prior evidence for associations between irregular sleep and high blood pressure is mixed.

Methods: We prospectively studied 55,572 UK Biobank participants with 5 or more days of valid accelerometry data and no history of hypertension or anti-hypertensive medication use (60% women, mean age 61 years). We estimated sleep regularity with the intra-individual standard deviation (SD) of sleep duration (sleep duration SD) and the sleep regularity index (SRI). Time-to-event Cox proportional hazards models estimated adjusted hazard ratios (HR) for incident hypertension—defined as the first occurrence of an ICD-10 I10 diagnosis in linked health records—by levels of sleep regularity. We evaluated effect modification by demographic and other sleep characteristics and interaction with genetic susceptibility for hypertension.

Results: There were 5,746 incident cases of hypertension over a median of 7.9 years of follow-up. After accounting for demographic, socioeconomic, and lifestyle factors, those with increased sleep duration irregularity (>90 minutes sleep duration SD) had an 18% higher risk of incident hypertension compared to those with sleep duration SD ≤30 minutes (HR [95% confidence interval (CI)]: 1.18 [1.06, 1.31]). Similarly, those with the most irregular day-to-day sleep/wake patterns (the lowest quintile of SRI) had a 40% higher risk for hypertension than those in the highest SRI quintile (95% CI: 1.29, 1.52). These patterns were consistent when sleep duration SD and SRI were treated as continuous variables. We did not observe any (clinically) meaningful effect modification, although joint analysis highlighted that those with the most irregular day-to-day sleep/wake patterns and the highest genetic risk for hypertension had the greatest risk of developing

hypertension, compared to those without both adverse factors, consistent with additive effects (HR [95% CI]: 1.91 [1.71, 2.12]).

Conclusion: These results suggest that maintaining consistent sleep schedules from day to day is associated with lower risk of developing hypertension, regardless of genetic susceptibility for hypertension, further supporting a role for sleep and rhythm regularity in cardiovascular health.

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EFFECTS OF SLEEP FRAGMENTATION AND HYPERTENSION ON COGNITIVE FUNCTION IN COMMUNITY-DWELLING OLDER ADULTS

Akiko Noda¹, Kyuto Yamazaki¹, Ikuha Fukamachi¹, Masato Okuda², Fumihiko Yasuma³

¹Chubu University Graduate School of Life and Health Sciences, ²Tajimi Sleep Clinic, ³Chubu University College of Life and Health Sciences

Introduction: Mild cognitive impairment (MCI) is the transitional state between normal cognition and dementia. Early diagnosis and appropriate lifestyle interventions at the MCI stage are crucial for the preventing further cognitive decline. Sleep fragmentation and insufficient sleep can increase levels of beta-amyloid and phosphorylated tau. Hypertension has been recognized as a risk factor for cardiovascular diseases. However, there is no consensus regarding the impact of sleep fragmentation and hypertension on MCI in older adults. This study investigated the effects of sleep fragmentation and hypertension on cognitive function in community-dwelling older adults.

Methods: Thirty volunteers aged ≥ 60 years (mean age 71.8 ± 4.6 years) were included in this study. Participants taking tranquilizers or hypnotic medications and those with moderate-to-severe sleep-disordered breathing (SDB) were excluded. Cognitive performance was assessed using the Mini-Mental State Examination (MMSE) and Touch Panel-type Dementia Assessment Scale (TDAS). We evaluated the total sleep time (TST), sleep efficiency, and wake after sleep onset (WASO) using actigraphy. The sleep complaints were assessed using the Pittsburgh Sleep Quality Index (PSQI). Excessive daytime sleepiness was evaluated using the Epworth Sleepiness Scale (ESS). We compared the data on hypertension, diabetes mellitus, hyperlipidemia, ESS, PSQI, and cognitive performance parameters between participants with TDAS score < 7 (non-MCI group) and those with TDAS score ≥ 7 (cognitive decline group). The Chubu University Ethics Review Committee approved the study protocol. All participants were informed of the study objectives and conditions of the study and provided written informed consent prior to the participation.

Results: The prevalence of hypertension was higher in the cognitive decline group than in the non-MCI group. WASO was significantly longer, and sleep efficiency was significantly lower in the cognitive decline group than in the non-MCI group. There were no significant differences in the age, ESS, or PSQI scores between the cognitive decline group and non-MCI groups.

Conclusion: Sleep fragmentation and hypertension were associated with cognitive decline in community-dwelling older adults. The evaluation of cognitive function along with actigraphy and blood pressure measurements could yield practical and theoretical implications for MCI.

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0996

CARDIOVASCULAR CRISIS SIGNAL: HYPOXIC BURDEN IS THE CRITICAL BIOMARKER LINKING INTERMITTENT HYPOXEMIA TO SUSTAINED BP ELEVATIONGabriela Brito¹, Paula Alana Seixas¹, Laís Mota², Henrique Terceiro¹, Miguel Cruz³, Cristina Salles²¹Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ²Escola Bahiana de Medicina e Saúde Pública, ³Universidade de Portugal

Introduction: Obstructive Sleep Apnea (OSA) is associated with chronic sympathetic activation and an increased cardiovascular risk, including sustained elevation of blood pressure (BP). Hypoxic Burden (HB) has been proposed as a quantitative indicator of the intensity and duration of hypoxemia during sleep, which may more accurately reflect the hemodynamic alterations related to OSA. Objective: To evaluate the association between the Hypoxic Burden and blood pressure levels in patients with OSA.

Methods: Methods: This was a cross-sectional study nested within a cohort evaluating 36 individuals, 58.1% of whom were women, with a mean age of 53.95 ± 11.86 years. Patients diagnosed with OSA were included. Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) measurements (mmHg) were collected, along with the Hypoxic Burden, measured using the formula considering the area under the oxyhemoglobin desaturation curve greater than 3%.

Results: Results: A predominance of Pardo (mixed-race) individuals was observed (n = 18; 41.9%). The mean Body Mass Index (BMI) was 30.77 ± 8.06 kg/m². Mean SBP was 133.00 ± 21.11 mmHg and mean DBP was 82.67 ± 13.48 mmHg. A positive correlation was found between HB and SBP values (r = 0.559; p = 0.030). Similarly, a significant positive correlation was observed between HB and DBP (r = 0.339; p = 0.038). A difference in mean DBP was observed between patients with and without elevated Hypoxic Burden: 80.4 ± 10.1 mmHg and 86.3 ± 15.7 mmHg, respectively. The same pattern was noted for mean SBP: 125.8 ± 15.7 mmHg and 138.1 ± 19.4 mmHg, respectively.

Conclusion: Conclusion: Our study establishes that Hypoxic Burden (HB) is the primary quantifiable driver of blood pressure dysfunction in Obstructive Sleep Apnea (OSA). The significant and positive correlation observed between HB and both systolic and diastolic blood pressure levels (SBP, DBP) strongly suggests that the intensity of intermittent hypoxemia is a superior and more biologically relevant indicator of cardiovascular risk than the mere event count (AHI).

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0997

IDEAL SLEEP MIDPOINT AND INFLAMMATORY ACTIVATION IN WAKE-UP STROKE

Yoo-Ha Hong, Hee-Jin Im

Dongtan Sacred Heart Hospital, Hallym University Medical Center

Introduction: Wake-up stroke (WUS) remains mechanistically unclear. Prior evidence suggests that circadian misalignment and intrinsic sleep timing may influence systemic inflammation, which could contribute to stroke onset during sleep. The

ideal sleep midpoint—conceptually derived from the pristine time framework that reflects an individual's preferred sleep timing under unconstrained conditions—may offer additional insight into sleep–inflammation interactions. This study compared pristine time–based sleep timing metrics, inflammatory markers, and clinical characteristics between WUS and non-WUS patients and explored whether these patterns support a preliminary conceptual model linking sleep timing, inflammation, and WUS.

Methods: We analyzed 250 acute ischemic stroke patients, categorizing them into WUS and non-WUS groups. Variables included demographics, risk factors of stroke, C-reactive protein (CRP), weighted total sleep time (wTST), pristine time-derived ideal sleep midpoint, ideal–actual sleep timing difference, and multiple sleep-related questionnaires. Group comparisons were performed to evaluate patterns potentially relevant to a sleep timing–inflammation pathway.

Results: Overall, 27.8% experienced WUS. Although differences were not statistically significant, the WUS group showed higher CRP levels, slightly shorter wTST, and a modestly later pristine time-derived ideal sleep midpoint compared with non-WUS group. Traditional risk factors of stroke and sleep questionnaire scores were similar between groups. While inconclusive, these directional trends are consistent with the hypothesized pathway linking intrinsic sleep timing and inflammation.

Conclusion: Although group differences did not reach statistical significance, the observed trends—higher CRP and a later pristine time–based ideal sleep midpoint in WUS—align with a potential sleep timing–inflammation mechanism. These findings should be interpreted as hypothesis-generating and support further investigation into a conceptual triangular model connecting intrinsic sleep timing (pristine time), systemic inflammation, and WUS.

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0998

DON'T SLEEP ON ATRIAL FIBRILLATION TRIGGERSPaul Schurmann, Jon Na, Aparajitha Verma, Miguel Valderrabano
Houston Methodist Hospital

Introduction: The remede system (Respicardia Inc., Minnetonka, MN, USA) is FDA-approved for the treatment of moderate to severe central sleep apnea (CSA) in patients with cardiovascular disease. However, whether treating CSA can reduce atrial fibrillation (AF) burden remains uncertain. Notably, randomized trials targeting obstructive sleep apnea have not demonstrated reductions in AF burden

Methods: We report a case of severe CSA, heart failure with reduced ejection fraction (HFrEF), and persistent AF refractory to extensive rhythm-control therapy, in which effective CSA treatment and led to resolution of AF.

Results: An 81-year-old man with HFrEF, persistent AF, coronary artery disease, hypertension, diabetes, and a cardiac resynchronization device presented with severe daytime sleepiness. His AF had been resistant to pulmonary vein isolation, dofetilide, and amiodarone, and he ultimately required AV node ablation. Home sleep study showed severe CSA with an AHI of 62 (3 obstructive apneas, 235 central apneas, 48 hypopneas). He underwent placement of a left phrenic nerve stimulator without complications (See Figure 1A), but later required lead extraction and replacement on the right side due to dislodgement. (See Figure 1B)

After optimizing phrenic nerve stimulation in April 2024, repeat polysomnography showed improvement with an AHI of 22.6 (1 obstructive apnea, 24 central apneas, 79 hypopneas) (See Figure 1E). The patient reported increased energy and resolution of his sleepiness. Notably, his AF burden dropped from 100% before therapy to < 0.1% over 20 months of follow-up. (See Figure 1C and 1D)

Conclusion: This case demonstrates resolution of persistent AF in a patient with severe CSA who had previously failed multiple rhythm-control strategies. Given the complex interplay between CSA and HF, effective treatment in severe central sleep apnea may reduce AF burden in certain patients. Awareness and further studies are necessary

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0999

EFFECT OF POSITIVE AIRWAY PRESSURE THERAPY ON HEALTHCARE RESOURCE UTILIZATION IN PATIENTS WITH COMORBID OBSTRUCTIVE SLEEP APNEA AND HYPERTENSION

Kimberly Sterling¹, R. Dexter², Atul Malhotra³, Caleb Woodford¹, Naomi Alpert², Will McConnell¹, Jean-Louis Pepin⁴, Kate Cole², Fatima Sert-Kuniyoshi¹, Peter Cistulli⁵

¹Resmed Science Center, ²Resmed, ³UC San Diego Health,

⁴University Grenoble Alpes, Inserm, CHU Grenoble Alpes,

⁵University of Sydney

Introduction: Obstructive sleep apnea (OSA) and hypertension frequently coexist with some estimates indicating that > 50% of those with OSA are also affected by hypertension. Positive airway pressure (PAP) therapy has been associated with modest improvements in blood pressure. This analysis investigated the association between adherence to PAP therapy with healthcare resource utilization (HCRU) in newly diagnosed OSA patients with comorbid hypertension.

Methods: This retrospective cohort study analyzed administrative claims from 2014 to 2023, linked with objective PAP therapy device usage data. Adults (≥ 18 years) with hypertension (based on ICD-9/10 codes) and newly diagnosed OSA who initiated PAP therapy were included. PAP therapy adherence was defined by the number of 90-day quarters in which a patient met CMS compliance criteria (≥ 4 hours/night on $\geq 70\%$ of nights in a 30-day period) over 1 year: adherent (4 quarters), intermediately adherent (1-3 quarters), and non-adherent (0 quarters). HCRU in the first year of PAP use was compared across adherence groups, after applying inverse probability of treatment weighting (IPTW) to balance groups on baseline characteristics.

Results: Among 283,938 OSA PAP-treated patients (44% female, mean age: 55 years), 67% met initial 90-day CMS compliance. Increasing adherence was associated with being male, older, commercially insured, and with lower comorbidity burden. Over 1 year, 72% were defined as at least intermediately adherent. After IPTW adjustment, adherent patients had significantly lower per-person rates of all-cause ER visits (0.56 vs. intermediately adherent: 0.64, $p < 0.001$; vs. non-adherent: 0.72, $p < 0.001$) and

all-cause hospitalizations (0.13 vs. intermediately adherent: 0.18, $p < 0.001$; vs. non-adherent: 0.19, $p < 0.001$). There was a 23% reduction in the risk of any cardiovascular-related HCRU event (cardiovascular-related ER visit or hospitalization) for adherent patients, relative to non-adherent patients (RR: 0.77, 95% CI: 0.74-0.81). Hospitalization and ER visit costs were also significantly lower for adherent compared to intermediately or non-adherent patients.

Conclusion: In real-world patients with OSA and comorbid hypertension, greater PAP adherence was associated with significantly lower healthcare utilization and costs. Emphasis on screening, diagnosing and treating OSA (including patient adherence support) in patients with hypertension may lead to better outcomes in this population.

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1000

EFFECTS OF A BEHAVIORAL SLEEP EXTENSION INTERVENTION ON SLEEP, PATIENT REPORTED OUTCOMES AND CARDIOMETABOLIC HEALTH OUTCOMES OVER 12 MONTHS

Kelly Baron¹, Jennifer Duffecy², Adam Bress¹, Molly Conroy¹, Sara Simonsen¹, Chelsea Allen¹, Tom Greene¹

¹University of Utah, ²University of Illinois at Chicago

Introduction: The goal of this study was to test the effects of an 8-week behavioral sleep extension intervention among adults with elevated blood pressure and objective sleep duration < 7 hours per night.

Methods: Adults ages 18+ with sleep duration < 7 hours documented using 7 nights of actigraphy and resting clinic blood pressure >120/80-150/90 mmHg, were randomized to an 8 weeks of brief telephone coaching, a Fitbit and sleep-focused educational content versus health education and a brief weekly phone call to confirm receipt of information. The intervention was followed by a 2-month maintenance period of monthly educational materials focused on sleep vs. general health education and monthly phone/email contact. Participants completed assessments at 8 weeks, 6 months and 12 months consisting of actigraphy, 24h ambulatory blood pressure monitoring (ABPM), cardiometabolic testing (BMI, body fat, HbA1c, triglycerides, cholesterol, and high sensitivity CRP (hsCRP)). Data were analyzed using mixed models controlling for age, race and ethnicity.

Results: The study included 120 participants, 60 sleep extension (age $m=42.2$, $sd=11.3$, $n=25$ females) and 60 health education (age $m=41.0$, $sd=10.2$, $n=23$ females). The intervention group demonstrated a greater change in sleep duration at 8 weeks and maintained their sleep duration at 12 months but the difference between groups was not significant. There was not a significance difference between the groups in sleep duration at 6 months or 12 months or for other actigraphy measures. The intervention group demonstrated greater improvement in depression scores but there were no other significant changes in self-reported sleep quality, sleep related impairment or perceived stress. There was a reduction in 24h SBP and DBP at 8 weeks and 6 months in the

control group but no change in the intervention group. The intervention group demonstrated decreases in triglycerides and VLDL at 8 weeks and 6 months. No other changes in cardiometabolic outcomes were observed.

Conclusion: Results demonstrate a behavioral sleep extension led to increased sleep duration and improved mood during the coaching period, but few improvements in cardiometabolic health. Future research is needed to understand variability in sleep outcomes and techniques to maintain changes over time.

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1001

INTERSECTION OF OBSTRUCTIVE SLEEP APNEA AND TREATMENT RESISTANT HYPERTENSION

Atul Malhotra¹, R. Dexter², Caleb Woodford³, Jean-Louis Pepin⁴, Naomi Alpert², Will McConnell³, Peter Cistulli⁵, Fatima Sert-Kuniyoshi³, Kate Cole², Kimberly Sterling³

¹UC San Diego Health, ²Resmed, ³Resmed Science Center,

⁴University Grenoble Alpes, Inserm, CHU Grenoble Alpes,

⁵University of Sydney

Introduction: Obstructive sleep apnea (OSA) frequently coexists with hypertension and when left untreated can negatively impact cardiovascular health. Although treatment for OSA has shown modest effects on blood pressure, evidence suggests increased benefits for those with treatment-resistant hypertension (TRH). This study sought to describe demographics and clinical characteristics of patients newly diagnosed with OSA with comorbid TRH.

Methods: This retrospective study examined administrative claims data (commercial, Medicaid, Medicare Advantage) for patients with newly diagnosed OSA (ICD-10 diagnosis within 60 days of a sleep test) between October 2024 and May 2025. Adults (≥ 18 years) with a diagnosis code for TRH (ICD-10: I1A.0; newly available in October 2023) in the year prior to OSA diagnosis were included. Patients were required to have ≥ 1 year of data prior to their sleep test. Comorbidities and prescription fills were identified in the year prior using ICD-10 diagnosis codes and NDC codes, respectively. Patients were described overall and by gender.

Results: A total of 843 patients met inclusion criteria (47% female, mean age: 53 years). The majority of patients had either commercial insurance (59%) or Medicaid (30%), and 70% had either obesity or severe obesity. Patients had a high comorbidity burden, with an average of 3.5 other conditions. Cardiometabolic conditions were common, including hyperlipidemia (70%), type 2 diabetes (40%), coronary artery disease (26%), heart failure (19%), and cerebrovascular disease (14%) with similar rates across gender. In women vs men, rates of asthma (23% vs. 11%), depression (34% vs. 17%), anxiety (45% vs. 23%), and gastroesophageal reflux disease (41% vs. 29%) were particularly high. Approximately 60% of patients had prescription fills for ≥ 3 different classes of antihypertensive agents in the prior year.

Conclusion: Patients with OSA and comorbid TRH often present with high rates of cardiometabolic, mental health, and respiratory comorbidities, particularly among women. These findings provide insight into the complexity of overlapping conditions for patients with OSA and TRH. Given the harmful effects of untreated OSA

on cardiovascular health, our results support consideration of screening, diagnosis, and treatment of OSA in TRH populations.

Support (if any): Resmed

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1002

THE HEMODYNAMIC-ELECTRICAL DIVERGENCE: ANALYSIS OF THE SLEEP APNEA PARADOX AND INCIDENCE OF ARRHYTHMIAS IN PERCUTANEOUS CORONARY INTERVENTION

Elsie Osiogo¹, Chimaobi Nwevo², Pascal Ezerioha³, Deepa Khemani⁴, Carmen Oviedo⁴, Raufun A. Hasan⁵

¹NYCHHC Lincoln Medical Center, ²South Brooklyn Health,

³Jacobi Medical Center/North Central Bronx, ⁴Lincoln Medical

Center, ⁵University of Rajshahi

Introduction: Obstructive Sleep Apnea (OSA) has been associated with increased long-term cardiovascular risk; however, its impact on short-term outcomes during hospitalization for percutaneous coronary intervention (PCI) is unclear. We utilized a large national database to determine the impact of obstructive sleep apnea on inpatient outcomes in patients undergoing PCI.

Methods: We performed a retrospective analysis of the U.S. National Inpatient Sample (NIS) for the years 2016–2019. All adult hospitalizations with PCI were identified by ICD procedural codes and grouped by a diagnosis code for OSA. Baseline characteristics were compared between the OSA and non-OSA groups. The primary outcome was in-hospital all-cause mortality. Secondary outcomes included major complications, length of stay (LOS), and total hospital charges. We used survey-weighted logistic regression to compute adjusted odds ratios (ORs) for binary outcomes and linear regression on log-transformed LOS and charges, controlling for baseline characteristics and hospital factors. Kaplan-Meier survival analysis was also performed.

Results: We identified 318,220 weighted hospitalizations with PCI, of which 37,815 (11.9%) had a diagnosis of OSA. The OSA group had higher prevalences of obesity, diabetes, hypertension, heart failure, and chronic lung disease. Despite having more cardiovascular risk factors, the OSA group had lower unadjusted in-hospital mortality (3.3% vs. 5.6%, $p < 0.001$). The unadjusted rates of new arrhythmia (32.1% vs. 27.1%, $p < 0.001$), in-hospital MI (34.5% vs. 26.5%, $p < 0.001$), and cardiogenic shock (7.0% vs. 10.0%, $p < 0.001$) also differed between groups. In multivariable analysis, In contrast, OSA was associated with higher adjusted odds of developing an arrhythmia (OR 1.20, 95% CI 1.14–1.27; $p < 0.001$) and lower odds of in-hospital MI (OR 0.71, 95% CI 0.67–0.75; $p < 0.001$) and cardiogenic shock (OR 0.70, 95% CI 0.63–0.77; $p < 0.001$). Patients with OSA also had modestly longer hospitalizations and lower total charges and higher in-hospital survival (log-rank $p < 0.001$).

Conclusion: In patients undergoing PCI, obstructive sleep apnea is associated with a "survival paradox" characterized by reduced mortality and hemodynamic collapse, potentially attributable to ischemic preconditioning or ascertainment bias. However, this survival advantage is accompanied by increased electrical instability. Clinicians should prioritize arrhythmia monitoring in this population while recognizing their distinct hemodynamic resilience.

Support (if any):

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1003

THE SCOPE TRIAL: SLEEP, COGNITION, AND PAIN BUNDLE VS. ERAS-CARDIAC [ENHANCED RECOVERY AFTER CARDIAC SURGERY] FOR POSTOPERATIVE DELIRIUM (POD)Karoline Sanchez Valdes¹, Anaëlle Charles², Andrea Castillo Suárez³, Mili Jimenez Gallardo³, Mansi Chhajed³, Jason Qu¹, Lei Gao³¹Massachusetts General Hospital, ²Perioperative Sleep and Brain Lab (PSBL), Medical Biodynamics Center, Massachusetts General Hospital, ³Massachusetts General Hospital/Harvard Medical School

Introduction: Sleep disruption is prevalent among older cardiac surgery patients and has been linked to postoperative delirium (POD) in up to a third of patients. POD is characterized by acute confusion and fluctuating attention, associated with long-term cognitive decline, dementia, prolonged hospitalization and even mortality. Despite this, perioperative interventions targeting sleep remain limited. The Sleep, Cognition, and Pain (SCOPE) bundle aims to reduce POD incidence compared to standard care of Enhanced Recovery After Surgery (ERAS)-cardiac.

Methods: This is a PCORI-funded randomized controlled trial at four sites (BIDMC, MGH, Columbia and OSU) targeting older patients (≥ 60 years) undergoing cardiac surgery. Beginning June 2025, 406 will be enrolled over 3 years. Participants are randomized to: 1) Intervention group: sleep optimization and cognitive training starting two weeks prior to surgery, plus eight doses of IV acetaminophen over 48 hours, or 2) Control group: Standard ERAS protocol with three doses over 24 hours. All participants will complete a daily sleep diary and wear an actigraphy before and after surgery. Primary outcome is POD incidence via Confusion Assessment method (CAM) within 7 days of surgery. Secondary outcomes include POD severity and duration, and cognition, functional, sleep, pain, and psychological outcomes up to 1 year after cardiac surgery.

Results: We will describe recruitment efforts, focus group findings and patient reception to sleep-related interventions thus far. We anticipate that the SCOPE bundle will reduce POD incidence and severity as well as improve recovery compared with standard ERAS care. Challenges are expected in recruitment and retention due to preoperative requirements and the high likelihood of postoperative complications that may affect adherence.

Conclusion: If effective, the SCOPE bundle will provide the first evidence-based, multimodal intervention to prevent POD in older cardiac surgery patients by optimizing sleep, cognition, and pain, while improving recovery and patient-centered outcomes.

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1004

TRANSVENOUS PHRENIC NERVE STIMULATOR, BEYOND GOOD NIGHT SLEEPPaul Schurmann, Jon Na, Miguel Valderrabano
Houston Methodist Hospital

Introduction: Transvenous phrenic nerve stimulator (TPNS) is effective therapy for central sleep apnea (CSA) in patient with cardiovascular disease. However, its impact on obstructive sleep apnea and atrial fibrillation remain unclear.

Methods: Objective is to describe our six-year experience using TPNS for CSA in patient with cardiovascular disease and evaluate its effects on OSA and atrial fibrillation. We performed a multi-institutional prospective cohort study of patients with moderate to severe CSA who underwent TPNS implantation from August 2019 to the present. Baseline characteristics and outcomes were collected prospectively. Polysomnography (PSG) results prior to implantation were compared with PSG post-optimization studies, and AF presence 6 month before and 6 month after TPNS optimization was assessed.

Results: A total of 38 devices were successfully implanted. Two patients (5%) experienced lead dislodgment requiring re-implantation; no other peri-procedural complications occurred. The cohort's mean age was 68.69 ± 10.42 years, with a mean CHADS-VASc score of 2 ± 1.86 . Sixteen of the 38 patients underwent optimization with polysomnography (PSG). Significant improvements were observed in: Apnea-Hypopnea Index (AHI): 43.4 ± 25.1 pre-treatment vs 21.2 ± 15.49 post-treatment ($p = 0.03$) Central sleep apnea events: 106.6 ± 75.07 pre vs 17.71 ± 17.93 post ($p < 0.01$) Mixed sleep apnea events: 25.06 ± 47.29 pre vs 1.67 ± 3.11 post ($p = 0.05$) Obstructive sleep apnea events: 9 ± 10 pre vs 23.5 ± 31.97 post ($p = 0.03$) Atrial fibrillation was present in 6 of 17 patients pre-treatment compared with 3 of 17 post-treatment ($p = 0.03$). Five of the six patients with atrial fibrillation had cardiac implantable electronic devices. The total average atrial fibrillation burden in these five patients was 100% before therapy and decreased to 66% after therapy ($p = 0.08$)

Conclusion: TPNS provides effective therapy for central, mixed sleep apnea, and marked improvements in AHI. Although obstructive sleep apnea events increased, atrial fibrillation burden improved following TPNS therapy. Further research is warranted, and careful patient selection remains critical

Support (if any):

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1005

IMPROVING SLEEP QUALITY AS A MECHANISM FOR ALLEVIATING PAIN SEVERITY: EVIDENCE FROM A THREE-ARM RCT OF PSYCHOLOGICAL TREATMENTS FOR FIBROMYALGIAMatthew Jennings¹, David Kalmbach¹, David Williams², Mark Lumley³¹Henry Ford Health, ²University of Michigan, ³Wayne State University

Introduction: Fibromyalgia (FM) is characterized by widespread pain, fatigue, mood disturbance, and nonrestorative sleep. Although poor sleep is often viewed as a consequence of chronic pain, longitudinal and experimental studies show that sleep disturbances predispose individuals to chronic pain and exacerbate pain. Research also suggests that interventions that improve sleep quality may enhance pain reduction. The present study was a secondary analysis of a three-arm randomized controlled trial that compared emotional awareness and expression therapy (EAET), cognitive-behavioral therapy (CBT), and FM psychoeducation (FM-Ed) on sleep and pain outcomes. We sought to determine whether improving sleep could be a treatment mechanism by which EAET and CBT reduced FM pain.

Methods: A sample of 230 adults with FM (77.8% white, 93.9% female, aged $M=49.1$ yrs) were recruited from the community, completed baseline Pittsburgh Sleep Quality Index (PSQIT1) and

Brief Pain Inventory (BPIT1), were randomized and received 8 weekly group sessions of EAET, CBT, or FM-Ed, and were then assessed on post-treatment outcomes (PSQIT2, BPIT2). The PRODCLIN method was used to test whether improving sleep quality (operationalized as PSQIT2-T1) mediated treatment effects of EAET/CBT on pain severity (BPIT2), compared to FM-Ed, controlling for BPIT1 and sociodemographics.

Results: Post-treatment, EAET produced significant improvements in sleep quality, $d=-0.54, p<.001$, and pain severity, $d=-0.39, p<.01$, relative to FM-Ed, whereas CBT showed significant improvements in only sleep quality, $d=-0.53, p<.001$, over FM-Ed. Mediation analyses indicated that improvements in sleep quality significantly mediated the treatment effect of both EAET (indirect effect= $-0.107, 95\%CI[-0.21, -0.03]$) and CBT (indirect effect= $-0.124, 95\%CI[-0.23, -0.04]$) models on post-treatment pain severity. In both therapies, patients who achieved clinically significant sleep-quality improvements (≥ 4 -point decrease on the PSQI) showed substantial reductions in pain severity (EAET=32.6%, CBT=28.0%), while more modest pain reductions were observed in patients whose sleep improved only a little (< 4 -point decrease; EAET=12.0%, CBT=5.5%).

Conclusion: These findings highlight sleep improvement as a promising treatment mechanism for alleviating FM pain. Integrating sleep-focused strategies into psychological pain interventions may enhance their effectiveness, with approaches that target both sleep and pain concurrently likely providing more comprehensive benefits for FM patients.

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1006

INVESTIGATING THE MODIFYING EFFECTS OF PAIN AND DEPRESSION ON THE RELATION BETWEEN SLEEP AND DIURNAL SALIVARY CORTISOL IN TEMPOROMANDIBULAR DISORDER

Heather Altier¹, Anirudh Sharma¹, Jeannie Leoutsakos¹, Claudia Campbell¹, Robert Edwards², Jennifer Haythornthwaite¹, Luis Buenaver¹

¹Johns Hopkins University School of Medicine, Department of Psychiatry and Behavioral Sciences, ²Brigham and Women's Hospital, Harvard Medical School

Introduction: Approximately 60% of individuals with temporomandibular disorders (TMD) experience poor sleep, and 20% report daytime sleepiness. Sleep disruption influences hypothalamic-pituitary-adrenal (HPA) axis activity, yet its effects on diurnal cortisol (DC) rhythms remain poorly understood, as pain and depression are prevalent in TMD and can alter basal HPA functioning. We examined how sleep quality and sleepiness relate to DC patterns, and whether pain severity and depressive symptoms modify these trajectories.

Methods: TMD patients (N=33) from a university facial pain clinic completed the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Brief Pain Inventory (BPI), and Beck Depression Inventory (BDI). Participants subsequently provided five saliva samples at 15-minute intervals after waking (cortisol awakening response; CAR) and seven samples every two hours from 10:00-22:00. Multilevel linear mixed-effects models examined the effects of PSQI and ESS on DC, with BPI pain severity and BDI as potential moderators. Likelihood ratio tests assessed whether

adding interactions improved model fit. DC was modeled with natural cubic splines, and estimated marginal means plots and contrasts compared predicted cortisol across PSQI and ESS levels over time.

Results: Participants (Mage=33.5±10.1 years, 70% female, 64% white) reported poor sleep quality (MPSQI=7.4±3.6) and daytime sleepiness (MESS=9.2±4.1; Mdn=10.0). Contrasts indicated that higher PSQI predicted blunted cortisol during the CAR and between 18:00-22:00 ($b=-0.37$ – -0.77 , all $ps<.05$). Higher ESS predicted elevated cortisol during the CAR only ($b=0.37$ – 0.47 , $ps<.05$). This association was amplified at low and mean BPI ($b=0.50$ – 1.12 , $ps<.05$) and, in participants with higher BDI, throughout the CAR and between 20:00-22:00 ($b=0.54$ – 0.84 , $ps<.05$). BPI and BDI did not modify PSQI effects.

Conclusion: These findings suggest the effects of sleep on cortisol are time- and context-dependent. Daytime sleepiness predicted elevated CAR at low-average pain, potentially reflecting a compensatory HPA response that is masked by high basal cortisol or dampened by chronic nociceptive stress at higher pain levels. Similarly, elevated depressive symptoms may amplify cortisol responses to acute sleepiness due to heightened stress sensitivity. No moderating effects were observed for PSQI, suggesting trait-like sleep disturbance may exert stable blunting effects on DC, whereas state-like sleepiness interacts with pain and mood.

Support (if any): Johns Hopkins Medicine Blaustein Pain Research Fund Grant

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1007

INSOMNIA WITH SHORT SLEEP DURATION IS ASSOCIATED WITH ASTHMA AND ALLERGIES: EVIDENCE FROM THE PENN STATE ADULT COHORT

Nikolaos Athanasiou¹, Alexandros Vgontzas¹, Slobodanka Pejovic¹, Julio Fernandez-Mendoza², Yun Li³, Georgia Trakada⁴, Edward Bixler¹

¹Penn State College of Medicine, ²Penn State University, Hershey, ³Shantou University Medical College, ⁴National and Kapodistrian University of Athens Medical School

Introduction: Asthma and allergies impair the quality of life of a substantial proportion of patients worldwide. Previous findings in clinical samples suggest that individuals with asthma and allergies have high frequency of insomnia symptoms. Many studies have shown that insomnia with short sleep duration phenotype (ISSD) is associated with cardiovascular and metabolic disorders. The aim of this study is to investigate whether ISSD is associated with asthma or allergies in a large random general population sample.

Methods: A total of 1741 participants from a general random sample of the Penn State Adult Cohort (52.3% women, aged 48.79±13.56) underwent 8-hour polysomnographic evaluation. Asthma and allergic status were defined by the participant's response to "Have you ever had asthma or allergies?" or the use of medication. Insomnia was defined by the presence of complaint of insomnia lasting ≥ 1 year or by the presence of complaint of difficulty falling asleep, staying asleep, nonrestorative sleep, or early morning awakening. Normal sleepers were defined by the absence of insomnia. Objective short sleep duration (SSD) was defined as < 6 hours' sleep based on polysomnography. Binary logistic regression was performed while controlling for age, sex, race, BMI, mental health problems, education, smoking, alcohol

consumption, caffeine use, apnea-hypopnea index and sampling weight.

Results: The prevalence of asthma/allergies was 27.7%. Compared to normal sleepers with normal sleep duration, only ISSD phenotype was associated with significant risk for asthma or allergies (OR=1.80, 95%CI=1.25-2.55, $p=0.001$). In contrast, neither the insomnia normal sleep duration (INSD) phenotype nor the normal sleepers SSD group were associated with increased risk for asthma/allergies.

Conclusion: These findings suggest that ISSD but not INSD phenotype is associated with asthma/ allergies further supporting that ISSD is the more severe biologic type of insomnia. Previous studies indicate that patients with asthma/allergy not treated with inhaled corticosteroids show attenuated hypothalamic-pituitary-adrenal (HPA) axis responsiveness and increased levels of pro-inflammatory cytokines. Similar HPA axis and inflammation alterations have been demonstrated in men with ISSD, suggesting a shared pathophysiological pathway underlying these two conditions.

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1008

INSOMNIA DURING CANCER THERAPY AND UNPLANNED ACUTE CARE UTILIZATION: A MULTICENTER COHORT STUDY OF SLEEP-RELATED TOXICITY

Randa Elzein¹, Safa Elzein²

¹SUNY Upstate Medical University, ²SUNY Upstate University Hospital

Introduction: Insomnia symptoms are highly prevalent during systemic cancer therapy and may exacerbate fatigue, cognitive dysfunction, and treatment intolerance. Despite recognition as a distressing symptom, the impact of insomnia on acute health-care utilization remains poorly quantified. Sleep disturbance represents an emerging, potentially modifiable toxicity of cancer treatment. This study evaluated whether patient-reported insomnia predicted unplanned emergency department visits or hospitalizations during active chemotherapy or immunotherapy to identify sleep as a target for supportive-care intervention.

Methods: We performed a multicenter retrospective cohort study of adults receiving systemic therapy for solid tumors or hematologic malignancies between 2019 and 2024. Insomnia was assessed at baseline and each treatment cycle using a standardized 0–10 numeric scale; clinically significant insomnia was defined as ≥ 4 . The primary outcome was any unplanned emergency-department visit or hospitalization within 30 days of a treatment cycle. Secondary outcomes included treatment delay, dose reduction, and corticosteroid escalation. Multivariable mixed-effects logistic models (patient random intercept) adjusted for age, sex, cancer type and stage, performance status, pain score, anxiety and depression screening, corticosteroid use, and treatment line. Propensity-score weighting and exclusion of planned admissions were performed as sensitivity analyses.

Results: Among 2486 patients across seven centers (mean age 61 ± 11 years; 54 % female; 34 % hematologic malignancy), clinically significant insomnia occurred in 46 % of treatment cycles. Unplanned acute-care use occurred in 22 %. Insomnia independently predicted higher odds of unplanned care (adjusted odds ratio 1.48, 95 % confidence interval 1.24–1.76; $p < 0.001$). A

dose–response relationship was observed per one-point increase in insomnia score (adjusted odds ratio 1.07 per point, 95 % confidence interval 1.04–1.10; $p < 0.001$). Associations remained consistent across cancer types and after propensity weighting. Insomnia also predicted treatment delay (adjusted odds ratio 1.22, 95 % confidence interval 1.03–1.45; $p = 0.02$) and corticosteroid escalation (adjusted odds ratio 1.31, 95 % confidence interval 1.10–1.56; $p = 0.003$).

Conclusion: Patient-reported insomnia during active cancer therapy independently predicted increased unplanned acute-care utilization and treatment disruption, supporting recognition of sleep disturbance as a clinically meaningful toxicity. Routine insomnia screening and rapid, non-pharmacologic management may reduce avoidable hospital visits and enhance treatment continuity.

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1009

EFFECTIVENESS AND SATISFACTION WITH LOW-SODIUM OXYBATE AS DESCRIBED BY ADULTS LIVING WITH NARCOLEPSY: LYRICAL SURVEY & INTERVIEW FINDINGS

Caroleen Drachenberg¹, Meagan Farrell², Jennifer D'Souza²,

Emily Kim², Meaghan Lawrence², Christina Graham²,

Marisa Whalen¹, Jessica Alexander¹, Silky Beaty¹, Sarah Markt¹,

Laura Herpel³

¹Jazz Pharmaceuticals, ²IQVIA, ³Bogan Sleep Consultants

Introduction: Low-sodium oxybate (LXB; Xywav®) is approved by the US Food and Drug Administration to treat cataplexy or excessive daytime sleepiness (EDS) in patients aged ≥ 7 years with narcolepsy. This longitudinal, mixed methods study (LYRICAL) examined participant-reported effectiveness and treatment satisfaction with LXB among US adults with narcolepsy.

Methods: Participants taking LXB for ≥ 12 weeks completed online surveys comprising standardized patient-reported outcome measures (including Patient Global Impressions of Change [PGIC], Patient Global Impressions of Severity [PGIS], and Treatment Satisfaction Questionnaire for Medication version 9 [TSQM-9]) and de novo items at three timepoints (enrollment, week 12, and week 24). A subset of participants completed qualitative interviews at enrollment and week 24. Data were analyzed descriptively.

Results: Fifty-nine participants with narcolepsy were enrolled with a mean age of 34.7 years (standard deviation [SD]=8.9) and mean 98.9 weeks (SD=73.4) on LXB. Most participants were female (91.5%), White (91.5%), and working full time (72.9%). After starting LXB, the percentage of participants taking alerting agents decreased from 89.8% to 67.8%. Most (93.0%) reported improvements in overall narcolepsy symptoms on the PGIC after initiating LXB. Symptom-specific PGICs indicated improvements in EDS (91.2%), feeling rested after nighttime sleep (87.7%), nighttime sleep quality (93.0%), sleep inertia (78.9%), and cataplexy (89.3%). High global satisfaction with LXB was reported (mean TSQM-9 score: 74.3); 86.0% reported being satisfied/extremely satisfied and 90.7% reported being somewhat/extremely confident that taking LXB was beneficial. Over 90% reported improved quality of life (QoL) compared with before LXB via PGIC, including ability to drive/exercise, improved focus, and better social life; improvements were maintained during the study. Interviewees ($n=15$) also described improvement or complete resolution of

EDS (73.3%), improved sleep quality (73.3%), and found it easy to wake in the morning (73.3%). Further, interviewees reported that LXB exceeded their expectations, reiterated high satisfaction, and indicated they were very likely to continue LXB treatment.

Conclusion: Final results from the real-world LYRICAL study indicated that many adults with narcolepsy taking LXB experienced improvements in multiple daytime and nighttime symptoms, including EDS and nighttime sleep quality, improved QoL, and high treatment satisfaction; improvements were sustained over time.

Support (if any): Jazz Pharmaceuticals

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1010

EFFECTIVENESS AND SATISFACTION WITH LOW-SODIUM OXYBATE AS DESCRIBED BY ADULTS LIVING WITH IDIOPATHIC HYPERSOMNIA: LYRICAL SURVEY & INTERVIEW FINDINGS

Caroleen Drachenberg¹, Meagan Farrell², Jennifer D'Souza², Emily Kim², Meaghan Lawrence², Christina Graham², Marisa Whalen¹, Jessica Alexander¹, Silky Beaty¹, Sarah Markt¹, Laura Herpel³

¹Jazz Pharmaceuticals, ²IQVIA, ³Bogan Sleep Consultants

Introduction: Low-sodium oxybate (LXB; Xywav®) is approved in the US for the treatment of idiopathic hypersomnia (IH) in adults. LYRICAL, a longitudinal, mixed methods study, examined the real-world treatment experience of US adults to provide details on the impact of LXB on a range of symptoms and treatment satisfaction in adults with IH.

Methods: Participants currently taking LXB for ≥12 weeks completed online surveys comprising standardized patient-reported outcome measures (including Patient Global Impressions of Change [PGIC], Patient Global Impressions of Severity [PGIS], and Treatment Satisfaction Questionnaire for Medication version 9 [TSQM-9]) and de novo questions at three timepoints (enrollment, week 12, and week 24). Qualitative interviews were conducted with a subset at enrollment and week 24. Data were analyzed descriptively.

Results: Forty participants with IH were enrolled (mean age: 32.7 years [standard deviation (SD)=8.0]; mean time taking LXB: 83.2 weeks (SD=65.9); most were female (72.5%), White (62.5%), and working full time (65.0%). The proportion of participants taking alerting agents decreased from 72.5% to 55.0% after LXB initiation. Most participants (89.5%) reported improvements in overall IH symptoms via PGIC after initiating LXB. Symptom-specific PGICs reflected improvements in excessive daytime sleepiness (EDS; 87.2%), feeling rested after nighttime sleep (89.7%), nighttime sleep quality (79.5%), and sleep inertia (89.7%). Participants reported high global treatment satisfaction (mean TSQM-9 score: 70.0), with 76.9% reporting being satisfied/extremely satisfied with LXB. Most (89.7%) reported improved quality of life (QoL) via PGIC after initiating LXB; improvements were maintained during the study. Among interviewees (n=13), most described feeling more awake/refreshed (76.9%) and improved sleep quality (61.5%) after starting LXB. Interviewees (12/12) reported improvement or complete resolution of EDS after initiating LXB. The majority of interviewees (61.5%) reported that prior treatments (e.g., alerting agents) were ineffective. All interviewees (100%) were

satisfied/very satisfied with their LXB experience and reported being very likely to continue LXB.

Conclusion: Final results from the real-world LYRICAL study highlighted that many adults with IH experienced sustained improvements in multiple daytime and nighttime symptoms with LXB treatment, including EDS and nighttime sleep quality, as well as QoL benefits and high treatment satisfaction.

Support (if any): Jazz Pharmaceuticals

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1011

INDIVIDUALIZED DOSING WITH LOW-SODIUM OXYBATE IN IDIOPATHIC HYPERSOMNIA: PATIENT VOICES FROM LYRICAL

Caroleen Drachenberg¹, Meagan Farrell², Jennifer D'Souza², Emily Kim², Meaghan Lawrence², Christina Graham², Marisa Whalen¹, Jessica Alexander¹, Silky Beaty¹, Sarah Markt¹, Laura Herpel³

¹Jazz Pharmaceuticals, ²IQVIA, ³Bogan Sleep Consultants

Introduction: In the US, low-sodium oxybate (LXB; Xywav®) is approved by the Food and Drug Administration for the treatment of idiopathic hypersomnia (IH) in adults, and has the option for individualized dosing. The LYRICAL study examined the real-world treatment experience of US adults taking LXB, to provide greater insights into LXB dosing patterns from the perspective of adults with IH.

Methods: This longitudinal, mixed methods study collected quantitative and qualitative data from participants currently taking LXB for ≥12 weeks. An online survey (n=40) consisting of standardized patient-reported outcome measures and de novo questions was administered at enrollment, week 12, and week 24. Interviews were conducted in a subset of participants (n=13) at enrollment and week 24. Descriptive analyses assessed LXB use patterns, including LXB dosing regimens, any variability/changes since enrollment, and perceptions of individualized dosing.

Results: In 40 participants, mean age was 32.7 years (standard deviation [SD]=8.0), and most were female (72.5%) and White (62.5%). Mean LXB treatment time was 83.2 weeks (SD=65.9). Most participants (85.0%) reported taking LXB twice-nightly, typically as 4.5 g + 4.5 g (20.6%) or 4.0 g + 4.0 g (17.6%), with 9.0 g being the most common total nightly dosage. Asymmetric doses were reported by 11 survey participants (32.4%), typically with a lower second dose. Participants worked with their healthcare providers to tailor their dosing regimens, with staying asleep (n=5) and help falling asleep (n=3) as the most common reasons for asymmetric doses. Those who adjusted their LXB regimen during the study (n=9) were more likely to report improved convenience and effectiveness (Treatment Satisfaction Questionnaire for Medication version 9). Interview data (n=13) showed that shared decision-making with providers helped participants reach their current dosing regimens, with slower dose titration as the most common consideration for dose adjustment. At enrollment and week 24 of the interviews, 8/11 and 9/10 participants, respectively, reported that an individualized regimen was helpful for their lifestyle.

Conclusion: Real-world findings from LYRICAL underscore the importance of individualized LXB dosing and shared decision-making, which allowed participants to tailor regimens to optimize management and achieve high treatment satisfaction.

Support (if any): Jazz Pharmaceuticals

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1012

INDIVIDUALIZED DOSING WITH LOW-SODIUM OXYBATE IN NARCOLEPSY: PATIENT VOICES FROM LYRICAL

Caroleen Drachenberg¹, Meagan Farrell², Jennifer D'Souza², Emily Kim², Meaghan Lawrence², Christina Graham², Marisa Whalen¹, Jessica Alexander¹, Silky Beaty¹, Sarah Markt¹, Laura Herpel³

¹Jazz Pharmaceuticals, ²IQVIA, ³Bogan Sleep Consultants

Introduction: In the US, low-sodium oxybate (LXB; Xywav®) is approved for treating cataplexy or excessive daytime sleepiness (EDS) in patients aged ≥7 years with narcolepsy and has the option for individualized dosing. However, research on how dosing patterns relate to treatment satisfaction is limited. To help address this, the LYRICAL study assessed real-world LXB use in US adults with narcolepsy.

Methods: This longitudinal, mixed methods study gathered quantitative and qualitative data from participants currently taking LXB for ≥12 weeks. Online surveys (n=59) comprising standardized patient-reported outcome instruments and de novo questions were administered at enrollment, week 12, and week 24. Interviews were conducted with a subset of participants (n=15) at enrollment and week 24. Descriptive analyses assessed LXB use patterns, including LXB dosing regimens, any variability/changes since enrollment, and perceptions of individualized dosing.

Results: In 59 participants, mean age was 34.7 years (standard deviation [SD]=8.9), and most participants were female (91.5%) and White (91.5%). Mean LXB treatment time was 98.9 weeks (SD=73.4). Nearly all participants (96.6%) reported taking LXB twice-nightly, most commonly 4.5 g + 4.5 g (34.5%), for a total nightly dosage of 9.0 g (range: 1.0–9.0 g). Eight survey participants (13.8%) were taking asymmetric doses at enrollment; the most common reasons were to help fall asleep (n=3) and avoid feeling groggy in the morning (n=3). Participants with dosing regimen adjustments (n = 12) between enrollment and week 24 were more likely to report improved convenience and effectiveness (Treatment Satisfaction Questionnaire for Medication version 9). All interview participants reported shared decision-making with providers; individualized titration helped them reach their current dose in a mean 10.6 weeks (SD=10.7); the most common consideration for dose adjustment during titration was sleep quality. Ten interview participants reported that individualized regimens were beneficial for their lifestyle, offering greater control and freedom.

Conclusion: Real-world data from LYRICAL highlighted that individuals with narcolepsy valued the ability to individualize their LXB dosing regimen through shared decision-making with health-care providers, contributing to optimized symptom control and improved treatment satisfaction.

Support (if any): Jazz Pharmaceuticals

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1013

MICU PATIENT CHARACTERISTICS INFLUENCE VARIATION IN LIGHT DURING THE DAY AND NIGHT PERIODS

Taylor Intihar, Omkara Rao, Preston Crase, Katherine Wasden, Vruksha Cabral, Margaret Doyle, Melissa Knauert

Section of Pulmonary, Critical Care, and Sleep Medicine, Department of Internal Medicine, Yale University School of Medicine

Introduction: Circadian disruption is common in the intensive care unit (ICU) and is associated with adverse outcomes. ICU light patterns are frequently abnormal (e.g., dim daytime and bright nighttime light levels). Our objective was to understand what factors are associated with the observed light patterns. We hypothesized that individual patient factors, such as patient age, sex, severity of illness (SOFA score), mechanical ventilation status, room direction, and season of admission, are associated with variation in light levels.

Methods: This observational cohort study was conducted in a medical ICU (MICU) from 2/2021-2/2022. Thirteen of 56 MICU rooms were preselected for light measurement during the 1-year study period. Patients admitted to light measurement rooms who were in their first ICU admission of hospitalization and remained for >48 hours were included in the cohort. Patient demographic and clinical data were recorded. Light intensity (lux) was recorded every 1 minute via HOB0-MX2202 light meters mounted to the wall just above the head of the bed to approximate angle of gaze. Mean lux, proportion of time>250 lux (gt250), and proportion of time< 10 lux (le10) were calculated for day (05:00-22:59) and night (23:00-04:59) periods. We selected the above-listed between-individual patient factors that we hypothesized could influence light levels. We then analyzed the proportion of variance due to between-individual factors via estimation of the intraclass correlation coefficient for unconditional models.

Results: 339 patients (50% female) were enrolled in the study; mean(SD) age was 66(15) years and SOFA score 6.8(3.5). Mean day and night light intensity was 173(177) lux and 62(119) lux, respectively. Daytime gt250 was 28%(42%) and le20 was 16%(33%). Night-time gt250 was 10%(28%) and le20 was 62%(45%). The selected factors explained 9-26% of daytime light variation and 47-54% of nighttime light variation, depending on the light outcome being tested.

Conclusion: There was a high degree of variation in MICU light levels. Differences in between-individual factors explained a notable proportion of the variation. This was especially pronounced during the night period. Further analysis will assess the degree to which each of the patient factors contributes to light variation and thus facilitate intervention in adverse MICU light patterns.

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01014

SLEEP AND PATIENT-REPORTED SYMPTOMS IN OLDER ADULTS DURING CRITICAL ILLNESS RECOVERY: COMPARISONS BY SLEEP MEDICATION EXPOSURE AND CHRONOTYPE

Fiona Wang, Hyo Chan Park, Chi-shan Tsai, Maya Elias
University of Washington

Introduction: Older adults recovering from critical illness experience fragmented nighttime sleep, daytime napping, and symptom burden that may influence the early recovery period through transition from intensive care unit (ICU) to acute care. It is unclear whether sleep medication administration or individual chronotype are associated with better sleep. Our primary aims were to

compare sleep and symptom profiles: 1) across sleep medication exposure groups, and 2) between chronotypes. Our exploratory aim was to identify factors associated with perceived sleep during the acute care observation period.

Methods: Our analysis included 27 older adult ICU survivors after transfer to acute care who consented to ≥ 24 hours of actigraphy/sleep observation. The primary exposure was sleep medication: no sleep medications, melatonin-only, or other (e.g., trazodone, quetiapine, etc). Chronotype was dichotomized as morning or intermediate/afternoon via the Composite Scale of Morningness. Sleep and symptom profiles included: actigraphy-measured/objective nighttime sleep (10:00PM-6:00AM) and daytime naps (6:00AM-10:00PM), daily perceived sleep ratings (0-10), and patient reported symptoms (PROMIS T-scores). Analyses used one-way ANOVA for medication groups, independent samples t-tests for chronotype groups, and multiple linear regression for average perceived sleep quality.

Results: Across medication groups, there were no significant differences in nighttime sleep, daytime naps, perceived sleep ratings, or patient-reported symptoms. However, intermediate/afternoon chronotypes reported worse sleep related impairment (65.23 versus 53.14; $p < .01$) and sleep disturbance (61.60 versus 52.41; $p < .01$). Among those still hospitalized on study observation day 5, intermediate/afternoon chronotypes tended to log more objective nighttime sleep and daytime naps than morning chronotypes, although this comparison was non-significant ($p = .09$). In multiple regression ($R^2 = 0.31$), sleep disturbance was a negative correlate of average perceived sleep ratings ($\beta = -0.58$; $p = .004$); chronotype, depression, and objective sleep were not associated.

Conclusion: In this cohort of hospitalized older adult ICU survivors after post-ICU transition to acute care, sleep medication exposure was not associated with improved sleep or symptom profiles. Day-by-day perceived sleep varied among those who received sleep medications and did not align with objective sleep. Findings suggest that future work should evaluate chronotherapeutic, non-pharmacologic interventions to improve sleep.

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01015

BASELINE SLEEP VARIABILITY AND TRAJECTORIES OF PAIN AND PRURITUS IN PATIENTS RECEIVING SURGERY FOR HIDRADENITIS SUPPURATIVA: A PILOT STUDY

Julia Russell¹, Lynn Nakad¹, Phoebe Wang², Carrie Cox³, Julie Caffrey¹, Sheera Lerman¹

¹Johns Hopkins University School of Medicine, ²Johns Hopkins University, ³Johns Hopkins Bayview Medical Center

Introduction: Sleep plays a role in inflammation regulation and wound healing, and sleep disturbance is common in patients with Hidradenitis Suppurativa (HS), a chronic inflammatory skin condition. Sleep has been linked to pain and pruritus in HS cross-sectionally, however it is unclear how sleep variability relates to post-surgical symptom trajectories for patients undergoing surgical excision. This study characterized baseline sleep variability and analyzed predictors of post-surgical change in patients undergoing surgical excision for HS.

Methods: Participants (N=18; mean age=32.17, 88.89% female) provided data at five time-points: pre-surgery, and 2, 6, 12 and 26 weeks post-surgery. A subset (N=16) completed 7-day sleep diaries pre-surgery; intraindividual standard deviations (SD) in Total Sleep Time (TST), Bedtime, and Wake Time were calculated. Outcomes were the PROMIS Sleep Disturbance Short Form 4a, Brief Pain Inventory (Pain Severity and Interference scores), and a 7-day average Itch Intensity visual analog scale assessed at all time-points. Spearman correlations and linear regressions tested associations between baseline sleep variability and longitudinal symptom trajectories (within-person slope).

Results: Participants demonstrated high daily sleep variability: TST mean (M)=6 hours 28 minutes, within-person SD M=135 minutes; Bedtime SD M=90 minutes; Wake Time SD M=78.4 minutes. There was a trend between TST variability and pain severity ($p = 0.05$). Longitudinally, sleep disturbance, pain severity, pain interference, and itch intensity significantly improved. TST, Bedtime and Wake Time variability all correlated with itch intensity slope ($p < 0.05$). In a linear regression including Bedtime and Wake Time variability and controlling for baseline itch intensity, Bedtime variability significantly predicted itch intensity slope ($F(3,12) = 7.027$, $p < 0.01$, adjusted $R^2 = 0.55$).

Conclusion: To our knowledge, this is the first study to evaluate sleep variability and its association with symptom trajectories in patients with HS following surgical excision. Even within this small pilot sample, participants exhibited marked variability in sleep timing and duration. Greater baseline irregularity was robustly associated with poorer pruritus improvement post-surgery. These preliminary findings highlight pre-surgical sleep variability as a promising and potentially modifiable target for optimizing postoperative symptom outcomes in patients with advanced HS. These results also underscore the need for larger, confirmatory studies.

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1016

POORER SLEEP EFFICIENCY PREDICTS ATTRITION FROM A LIFESTYLE MEDICINE INTERVENTION IN WORLD TRADE CENTER RESPONDERS

Danica Slavish¹, Isamar Almeida¹, Camilo Ruggero², Benjamin Luft³, Roman Kotov³

¹University of North Texas, ²University of Texas at Dallas, ³Stony Brook University

Introduction: World Trade Center (WTC) responders suffer from high rates of chronic diseases such cancer, cardiovascular disease, respiratory disease, and mental health conditions. Lifestyle medicine approaches — which focus on promoting healthy behaviors such as regular exercise, Mediterranean diet, and adequate sleep — can prevent and reverse WTC-associated diseases. Lifestyle medicine interventions are effective but are constrained by high attrition rates (~50%). Behavioral predictors of attrition from these interventions are not well-understood. To address this gap, we examined: 1) Fitbit estimates of sleep and physical activity, 2) self-reported personality and mental health, and 3) large language model (LLM) derived estimates of sleep and physical activity as predictors of attrition from a lifestyle medicine intervention.

Methods: Participants were 323 WTC first responders enrolled in the WTC Health Program in Long Island, NY between 2023-2025. Participants completed a 6-month lifestyle medicine intervention, which involved 4 visits with a registered dietician, wearing a Fitbit Inspire 3 device for one week at baseline, as well as completing self-report surveys to assess personality and mental health. LLM derived variables were computed using ChatGPT5 estimates of sleep and physical activity from intake visit audio transcripts between participants and dieticians.

Results: Together, predictors explained 9% of the variance in attrition (AUC = 67%). Higher Fitbit sleep efficiency at baseline predicted lower odds of attrition from the lifestyle medicine intervention (OR = 0.58, $p = 0.004$). Higher self-reported extraversion predicted higher odds of attrition (OR = 1.54, $p = 0.005$). Other Fitbit, self-report, and LLM-derived variables did not predict attrition.

Conclusion: Results suggest fragmented sleep may be a strong risk factor for study dropout. Targeting sleep via cognitive behavioral therapy for insomnia may improve study engagement and adherence to lifestyle medicine practices.

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1017

PREDICTORS OF POST-COVID CLINICAL AND COGNITIVE CONSEQUENCES: PILOT STUDY

Chandra Miryala¹, Danny Greig¹, Ruchi Rastogi¹, Bradley Axelrod¹, Safwan Badr¹, Lili Zhao², Susmita Chowdhuri¹

¹John D. Dingell VA Medical Center, ²Northwestern University

Introduction: "Post-acute sequelae of SARS-COV-2 infection (PASC)" is a condition with a wide range of physical and mental health consequences that are present four or more weeks after SARS-COV-2 infection. Fatigue is one of the common post-COVID conditions, but whether sleep disturbances due to COVID-19 infection influence the chronic physical and mental health consequences are unknown. The aim of this pilot study is to assess if PASC is associated with sleep disturbances and cognitive deficits.

Methods: We prospectively collected sleep quality, neurocognitive and quality of life (QoL) data in patients with PASC and OSA and control participants with OSA alone. Questionnaires and a battery of neurocognitive tests were also administered after 3 months in patients with PASC. COVID-infection related data was also collected.

Results: We have enrolled 135 total participants thus far; 76 patients with PASC (63 males, 13 females; age: 62.0±12.6 years, BMI: 31.07±4.93 kg/m², AHI: 40.46±27.71 events/hr, Education: 14.5±2.18 years) and 57 controls (48 males, 9 females; age: 65.1±12.0 years, BMI: 31.8±8.5 kg/m², AHI: 41.4±27.5 events/hr, Education: 14.4±2.6 years). At baseline, compared with controls, PASC group had reduced sleep quality (PSQI: 7.3±3.8 vs 6.2±3.3, $p=0.04$), and increased fatigue (FSS:38.4±13.9 vs. 33.17±14.8, $p=0.05$). Reaction times on PVT were increased but similar 366±310. vs 343±248 ms. Trails A and B standard scores were higher but in the normal range for both PASC and control groups: 104.73±14.69 vs 93.18±16.41, $p < 0.001$. Other cognitive tests were similar between the groups. There were no significant differences

in the measured parameters at 3 months vs baseline in PASC individuals.

Conclusion: Compared with OSA controls, PASC+OSA group had reduced sleep quality and greater fatigue. PVT showed impairment in sustained attention in both groups.

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1018

DAILY ASSOCIATIONS BETWEEN SLEEP AND GLUCOSE: EVIDENCE FROM ACTIGRAPHY AND CONTINUOUS GLUCOSE MONITORING

Jamie Walker¹, Ivan Vargas²

¹University of Arkansas, ²University of Notre Dame

Introduction: Sleep duration and sleep continuity disturbance have been linked to impaired glucose regulation, but most evidence comes from laboratory-based or cross-sectional studies, limiting the ability to evaluate day-to-day associations between sleep and glycemic outcomes. This study tested whether nightly fluctuations in total sleep time (TST) and total wake time (TWT) predict next-day glycemic outcomes (i.e., glucose immediately after waking and average glucose during waking hours). We hypothesized that shorter TST and greater TWT would predict higher glucose levels the following day.

Methods: Seventy-seven adult participants with insomnia (Mage = 39.2 years, SD = 11.9; 61.8% women; 73.7% White) wore an actigraphy watch and continuous glucose monitor for 10 consecutive days. Sleep variables included nightly TST and TWT derived from actigraphy. Glucose variables included fasting glucose (defined as the first glucose value recorded upon awakening) and average daytime glucose (from wake time to bedtime) derived from continuous glucose monitoring data sampled at 5-minute increments. Linear mixed-effects models accounted for repeated daily observations nested within individual participants. Separate models tested whether TST and TWT predicted the following day's glucose outcomes.

Results: TST significantly predicted next-day waking glucose, such that nights with shorter sleep duration were associated with higher next-morning blood glucose ($F(1, 552) = 4.89$, $p = .028$). By contrast, TST did not significantly predict next-day average glucose. TWT was also examined as a predictor in additional models but did not significantly predict either glucose outcome.

Conclusion: Night-to-night variations in sleep duration were associated with next-morning glycemic levels, such that shorter sleep predicted elevated glucose immediately upon waking. In contrast, sleep duration did not predict average glucose across the subsequent day. These findings suggest that glucose levels upon awakening may be particularly sensitive to the prior night's sleep. Overall, the results highlight sleep duration as a modifiable behavioral factor with implications for metabolic functioning and underscore the value of multimodal, real-world monitoring for capturing dynamic sleep-glycemia relationships. Additional analyses are underway to evaluate within-subject effects, including whether person-centered fluctuations in sleep predict corresponding fluctuations in glucose.

Support (if any): SRS Foundation and AASM Foundation Small Research Grant

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1019

FROM HORMONES TO THE BED: DOES THYROID FUNCTION MODULATE SEXUAL AND SLEEP HEALTH IN MEN FROM THE CROSS-SECTIONAL EPISONO COHORT?Renata Karine de Carvalho¹, Tathiana Alvarenga², Maingredy Souza³, Matheus Vasco¹, Renata Mazaro-Costa⁴, Sergio Tufik¹, Monica Andersen³¹Universidade Federal de São Paulo, ²Instituto do Sono, Associação Fundo de Incentivo à Pesquisa, ³Departamento de Psicobiologia, Universidade Federal de São Paulo, ⁴Universidade Federal de Goiás

Introduction: Erectile dysfunction (ED) and sleep disturbances are highly prevalent conditions that share neuroendocrine, metabolic, and autonomic pathways. Evidence suggests bidirectional interactions between thyroid function, sleep physiology, and sexual health. This study investigated whether thyroid hormones interact with ED status to influence objective sleep parameters in adult men.

Methods: This cross-sectional study used data from the 4th edition of the São Paulo Epidemiological Sleep Study (EPISONO), conducted in 2018, which included 769 adults (317 men). After excluding individuals who reported the use of sleep-related medications (benzodiazepines, Z-drugs, melatonin), thyroid medications, or tadalafil, as well as those without essential hormonal or sleep data, the final sample comprised 286 men (230 without ED; 56 with ED). ED status was defined by self-report. All participants underwent full-night polysomnography and morning fasting blood collection for hormonal assessment of thyroid-stimulating hormone (TSH), free thyroxine (FT4), total thyroxine (T4), and total triiodothyronine (T3). Generalized Linear Models adjusted for age and body mass index (BMI) compared hormonal and sleep outcomes between ED groups. Interaction effects between ED and thyroid hormones (TSH, FT4) on sleep outcomes were evaluated using moderation models.

Results: No significant differences were observed between groups for TSH, T4, FT4, or T3. Men with ED showed a markedly altered sleep architecture, with a lower percentage of N3 sleep. This reduction remained significant after adjusting for age, BMI, or both. Moderation models indicated that ED interacted with TSH to predict total sleep time, wake after sleep onset (WASO), N1%, N2%, N3%, and arousal index. Similar interactions were identified for FT4, influencing wake time, WASO, sleep efficiency, and N2%.

Conclusion: ED was associated with poorer objective sleep quality, particularly reduced N3%, independent of age and BMI. Thyroid hormones amplified the influence of ED on several sleep parameters, indicating a synergistic effect between ED status and thyroid function on sleep physiology. These findings support an integrated relationship between sexual health, thyroid regulation, and sleep architecture.

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1020

LONG-TERM IMPACT OF PSILOCYBIN ADMINISTRATION ON SLEEP-CONTINUITY VIA WEARABLE SENSOR TIME-SERIES: PRELIMINARY-RESULTS IN POST-TREATMENT LYME DISEASEMatthew Reid¹, Abigail Yaffe², Ian Geithner³, Alison Rebman³, John Aucott³, Albert Garcia-Romeu³¹Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, ²Johns Hopkins School of Medicine, ³Johns Hopkins University School of Medicine

Introduction: Post-treatment Lyme Disease (PTLD) is a post-infectious syndrome characterized by fatigue, hypersomnia, sleep-disturbance, musculoskeletal pain and/or cognitive difficulties. As part of an open-label pilot study of psilocybin-assisted treatment for PTLD, we explored potential for psilocybin-assisted treatment to remedy sleep-related disturbances in this population.

Methods: 12 participants consented to undergo continuous sleep-monitoring using a non-intrusive consumer smart-ring, throughout an 8-week treatment protocol, which included two psilocybin sessions (15mg and 25mg at weeks 4 and 6, respectively), with follow-up assessments 1, 3, and 6 months after the final psilocybin session. Sleep data were captured continuously throughout the entire study period, beginning three weeks prior to the first dosing session. We obtained nightly estimates of Total Sleep Time (TST mins), which were modeled using Bayesian structural time-series (BSTS) models.

Results: BSTS models indicated a cumulative reduction in total sleep time (TST) following the first psilocybin session (-613 min; 95% Credible Interval: -1216 to -33), with a high posterior probability of a causal effect (97.9%). Following the second session, the cumulative reduction was smaller (-153 min; 95% Credible Interval: -458 to 165) and accompanied by greater uncertainty. Average causal effects across the post-session windows were -32 min (95% Credible Interval: -64 to -2) after session one and -17 min (95% Credible Interval: -51 to +18) after session two. However, the credible interval for session two spanned zero, indicating reduced certainty regarding both the presence and direction of the effect relative to session one.

Conclusion: Findings suggest a long-term reduction in actigraphy-TST following psilocybin administration that was maximal following the first dose. This decrease in actigraphy-TST could reflect a normalization of hypersomnia and excessive sleep drive typically observed in PTLD. Future work is required to further align these findings within the conceptual framework of PTLD symptomatology by examining whether these actigraphic estimates of sleep continuity align with participant-reports of sleep quality, and daytime somnolence.

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1021

OBSTRUCTIVE SLEEP APNEA AND CPAP EFFICACY IN HYPERMOBILE EHLERS-DANLOS SYNDROME AND HYPERMOBILITY SPECTRUM DISORDER PATIENTS: A CASE-CONTROL STUDY

Kenneth Zhang¹, Rebecca Wallon², Christina Laukaitis², Charles Davies¹¹Carle Illinois College of Medicine, ²Carle Health

Introduction: Hypermobile Ehlers-Danlos syndrome (hEDS) and Hypermobility Spectrum Disorder (HSD) are genetic tissue disorders. They exist on a spectrum with association to various sleep disorders including insomnia and obstructive sleep apnea (OSA), leading to chronic fatigue and daytime sleepiness. Structural and soft tissue abnormalities of the oropharynx in hEDS/HSD patients may exacerbate OSA; these patients may respond differently to continuous positive airway pressure (CPAP).

Methods: A retrospective review of patients with OSA between 2020 – 2024 at a single institution was conducted. Adults with hEDS/HSD and OSA (cases) were matched based on sex, age, and body mass index (BMI) to adults with OSA alone (controls). Data from polysomnograms (PSG), initial sleep clinic consults, and clinic visits 3-9 months post CPAP were extracted for statistical analysis. The Epworth Sleepiness Scale (ESS) was used to assess daytime sleepiness.

Results: 68 patients with hypermobility (47% hEDS, 53% HSD, Beighton score 5.71 ± 2.29 , age 34.07 ± 13.28 , BMI 32.88 ± 8.47) were included as cases with successful matching to 68 controls. All pairs completed sleep clinic consults and polysomnograms; 53 pairs pursued CPAP; 41 pairs were reevaluated in clinic within 3–9 months. The hypermobile cohort exhibited significantly lower sleep efficiency ($77\% \pm 16\%$ vs $82\% \pm 10\%$, $p=0.0396$) and a higher prevalence of insomnia (44% vs 34% , $p=0.0348$). Pre-treatment ESS were similar between cases (10.39 ± 4.89) and controls (11.22 ± 5.12) ($p=0.4990$). CPAP significantly reduced ESS in controls by 4.46 ($p < 0.0001$) but had no significant effect in cases, with a decrease of 1.56 ($p=0.0620$). After treatment, ESS remained higher in cases (8.83 ± 4.47) than controls (6.76 ± 4.15) ($p=0.0414$). Cases and controls had similar CPAP compliance rates of >4 hours per night ($75.6\% \pm 25.2\%$ vs $74.6\% \pm 26.7\%$, $p = 0.8570$), Apnea-Hypopnea Index (16.86 ± 28.09 vs 12.48 ± 16.38 , $p = 0.2444$), and lowest SpO₂ ($86.08\% \pm 4.31\%$ vs $85.67\% \pm 3.52\%$, $p = 0.5097$).

Conclusion: CPAP does not significantly improve daytime sleepiness in hypermobile patients despite adequately reducing apnea frequency, suggesting that OSA may not be the primary contributor to chronic fatigue and sleepiness in this patient population. hEDS/HSD should be considered when assessing sleep consolidation and residual sleepiness in response to CPAP therapy.

Support (if any):

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1022

ELEVATED PLASMA ALKALINE PHOSPHATASE AND ACTIGRAPHY-DERIVED SLEEP MEASURES IN AN AGING POPULATION

Carla Gibbs¹, Judite Blanc¹, Velarie Ansu², Matthew Betancourt¹, Ciné Brown³, Tatjana Rundek¹, Azizi Seixas², Girardin Jean-Louis²¹University of Miami Miller School of Medicine, ²University of Miami, ³Sylvester Comprehensive Cancer Center

Introduction: Sleep and circadian disturbances are early physiological changes observed in Alzheimer's disease (AD) and Alzheimer's disease-related dementias (AD/ADRD). Alkaline phosphatase (AP), an enzyme involved in vitamin D and calcium metabolism, is elevated in AD and contributes to inflammation, impaired calcium signaling, and weakened blood-brain barrier integrity. However, the relationship between circulating AP levels and objective sleep metrics remains unclear. This study examined whether AP levels are associated with sleep duration and sleep fragmentation in older adults.

Methods: A total of 366 Black adults (67% female; mean age = 65 years) enrolled in the NIH-funded MOSAIC sleep study provided blood samples between January 2020 and December 2025. Plasma samples from a subset of 44 participants were classified into two groups [high-AP (> 129) ($n = 21$) and normal-AP ($40.0 - 129.0$) ($n = 23$)], based on clinical guidelines. Wrist actigraphic data was collected for up to 7 days. Mean nightly sleep duration (minutes) and mean number of awakenings were derived using a standard scoring algorithm. Pearson correlation analyses in Microsoft Excel assessed associations between AP levels and sleep outcomes.

Results: Participants in the high-AP group slept an average of 298.32 minutes per night, compared with 388.13 minutes in the normal-AP group (approximately 5.0 vs. 6.5 hours). The high-AP group also exhibited a slightly higher mean number of awakenings (7.97 vs. 7.67). AP levels explained 17% of the variance in sleep duration ($R^2 = 0.1705$), with a positive correlation within the high-AP range ($\rho = 0.413$). In the normal-AP range, AP levels showed a weak inverse relationship with sleep duration ($R^2 = 0.0421$; $\rho = -0.205$). Associations between AP and sleep fragmentation were negligible across both groups, with very small R^2 values and weak correlations.

Conclusion: These preliminary findings indicate that elevated plasma AP correlated with shorter sleep duration among older adults. Larger-scale research should investigate epigenetic and biochemical pathways through which AP may influence calcium and vitamin D signaling and downstream circadian regulation relevant to AD/ADRD risk.

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1023

INFRASLOW OSCILLATIONS DURING SLEEP IN LONG-TERM SURVIVORS OF PEDIATRIC HODGKIN'S LYMPHOMA

Jack Goldstein¹, Miguel Navarrete¹, Alejandro Osorio-Forero², Melissa Hudson¹, Belinda Mandrell¹, Kevin Krull¹¹St. Jude Children's Research Hospital, ²Netherlands Institute for Neuroscience

Introduction: The locus coeruleus (LC) is a primary source of noradrenaline (NA), which plays a key role in arousal, attention, and memory function. Evidence suggests that the fluctuation of NA on an infraslow timescale of ~50s can be tracked by changes in electroencephalographic (EEG) sigma power (ISFS, ~0.02 Hz) during non-rapid-eye movement sleep (NREM). Adult survivors of childhood Hodgkin's Lymphoma (HL) have increased incidence of sleep disturbance and cognitive dysfunction, as well as many demonstrating autonomic nervous system dysfunction. Due to the role of LC-NA signaling in cognitive function, we conducted an exploratory analysis to evaluate the sleep dynamics of ISFS in HL survivors compared to healthy controls.

Methods: A retrospective analysis was conducted on St. Jude Life-time Cohort Study. Participants completed two nights of home-polysomnography (PSG) and the Pittsburgh Sleep Quality Index (PSQI). The PSG recording containing the greatest number of 5-minute sections of Stage 2 sleep (NREM2) was selected for each participant. HL survivors (N=139) and community controls (N=119) were matched by sex, race, and BMI. EEG sigma power (12–16 Hz) time-course was computed by averaging the frequency decomposition of 5-minute NREM2 sections. ISFS dynamics including bandwidth, peak frequency, peak power, and area under the curve (AUC) were estimated using the power spectral density. Spindle events were further identified. Linear regression models compared survivors and community controls, adjusting for age, sex, race, and BMI.

Results: Compared to controls, survivors reported worse sleep quality (PSQI; survivor: 7.25 ± 4.2 , control: 5.36 ± 2.7 , $p < 0.001$), and had ISFS higher peak power ($\beta = 917 \times 10^{-3}$, $p = 0.002$) and AUC ($\beta = 15 \times 10^{-3}$, $p < 0.001$). No differences in ISFS frequency ($\beta = 146 \times 10^{-6}$, $p = 0.630$) nor bandwidth ($\beta = 375 \times 10^{-6}$, $p = 0.340$) were observed. ISFS dynamics were not correlated with PSQI. Spindle density, sleep time, and duration of NREM2 did not differ among survivors and controls.

Conclusion: Our findings suggest variable autonomic regulation during sleep in HL survivors, characterized by intensified ISFS potentially linked to increased spindle clustering. Since spindle-rich ISFS peaks have been previously associated with arousal regulation and memory consolidation, this may represent a neurophysiological marker of cognitive function among survivors. Future research should investigate ISFS as a potential mechanism of cognitive function.

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1024

LONGITUDINAL EVALUATION OF SLEEP DISTURBANCES IN SURVIVORS OF CHILDHOOD CANCER: A REPORT FROM THE CHILDHOOD CANCER SURVIVOR STUDY (CCSS)

Lauren Daniel¹, Huiqi Wang², Tara Brinkman², Kathy Ruble³, Eric Zhou⁴, Oxana Palesh⁵, Rebecca Howell⁶, Daniel Mulrooney², Valerie Crabtree², Sogol Mostoufi-Moab⁷, Kevin Oeffinger⁸, Joe Neglia⁹, Yutaka Yasui², Greg Armstrong², Kevin Krull¹⁰

¹Rutgers University, ²St. Jude Children's Research Hospital, ³Johns Hopkins School of Medicine, ⁴Harvard Medical School, ⁵Virginia Commonwealth University School of Medicine, ⁶MD Anderson, ⁷The Children's Hospital of Philadelphia, ⁸Duke University Medical School, ⁹University of Minnesota Medical School

Introduction: Surviving childhood cancer and aging are both risk factors for poor sleep. The current study examines longitudinal changes in sleep in childhood cancer survivors relative to siblings and the risks that persistent sleep disturbances pose for new onset health conditions.

Methods: Five-year survivors (N=1,081; median [range] age 50.0 [45.2-55.0] years) and siblings (N=214; age 49.2 [39.9-51.1] years) from the Childhood Cancer Survivor Study completed the Pittsburgh Sleep Quality Index (PSQI) at two timepoints (median interval=17 years, range 15-18 years). Changes in PSQI scores over time were assessed, stratified by sex and adjusting for demographics, using generalized estimating equation. Within survivors, logistic regressions estimated associations between persistent clinically significant sleep disturbances (PSQI total score >5 at

both time points) with diagnosis and treatment exposures, and new onset chronic health conditions.

Results: Female siblings reported increases in sleep disturbances (Change from a prevalence of 35% at T1 to 47% at T2; PR=1.30 95% CI 1.04-1.62). However, increases among female survivors (T1 40% to T2 49%; PR=1.25, 95% CI 0.99-1.58), male survivors (T1 34% to T2 44%; PR=0.98, 95% CI 0.68-1.40), and male siblings (T1 24% to T2 32%; PR=1.28, 95% CI 0.86-1.91) did not achieve statistical significance. Male survivors were more likely to report sleep disturbances compared to male siblings at T2 ($p=.034$), but differences between female survivors and siblings were not significant ($p=.709$). Survivors reporting persistent sleep disturbances were more likely to develop new onset hypertension (PR=1.46, 95% CI 1.02-2.14), migraines (PR=1.90, 95% CI 1.40-2.58), and emotional distress (PR=8.07, 95% CI 4.07-16.00) but not subsequent malignancies (PR=1.03, 95% CI 0.52-2.01).

Conclusion: Persistent sleep disturbances are associated with increased risk for new onset of chronic physical health conditions and emotional distress. Screening for and treating sleep disturbances early in the trajectory of childhood cancer survivorship should be evaluated for prevention of new onset of chronic health conditions.

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1025

ASSOCIATIONS OF SUBJECTIVE AND OBJECTIVE SLEEP QUALITY WITH PAIN AND DEPRESSION AMONG ADULTS WITH FIBROMYALGIA

Roberto Gonzalez-Prado¹, Mark Lumley¹, Matthew Jennings², Steven Harte³, David Williams³

¹Wayne State University, ²Henry Ford Health, ³University of Michigan

Introduction: Fibromyalgia (FM) is a chronic pain condition that affects 2-4% of Americans, particularly women of middle age. FM is marked by widespread pain and usually by difficulties sleeping and mood problems, such as depression. Pain and sleep problems are thought to exacerbate each other. Although pain is typically assessed by self-report, sleep quality can be assessed both subjectively and objectively, such as with sleep actigraphy. How these measures of sleep relate to pain and depression in people with FM is unclear, and subjective reports of sleep may be more biased by affective state than objective reports.

Methods: Our study investigated 194 adults with FM (94% female, 78% White, age M = 49.67, SD = 12.14). We assessed self-reported daily pain (14-day average; sample M = 5.18 on 0-10 scale), self-reported depressive symptoms (CES-D; M = 21.04, SD = 11.79), self-reported subjective sleep problems (Pittsburgh Sleep Quality Index; M = 12.51, SD = 4.18), and objective sleep efficiency (SE: amount of sleep divided by time-in-bed; M = 82.14%, SD = 7.57) using an Actiwatch, which participants wore continuously through a 2-week period. We ran Pearson correlations between pain and both objective and subjective sleep measures, before and after controlling for depressive symptoms.

Results: Greater subjective sleep problems were significantly ($p < .05$) correlated with lower objective SE ($r = -.18$), and greater pain was significantly correlated with greater subjective sleep problems ($r = .31$) and lower objective SE ($r = -.20$). Depressive symptoms were correlated with greater pain ($r = .21$) and poorer subjective sleep ($r = .50$), but not with objective SE ($r = .07$). After controlling for depression, pain was no longer correlated with subjective sleep problems ($p = .07$) but remained marginally ($p < .10$) correlated with objective SE ($p = -.13$).

Conclusion: Results suggest that pain and sleep problems in FM are associated, but that the method of sleep assessment matters. Objective assessment of sleep via actigraphy may provide an index that is less confounded by negative affect, suggesting actigraphy may be a more valuable method of sleep assessment than self-report measures.

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DAYTIME SYMPTOM BURDEN AND PSYCHOLOGICAL DISTRESS IN GREEK PATIENTS WITH OBSTRUCTIVE SLEEP APNEA AND COMISA: FINDINGS FROM A CLINICAL COHORT

Nikolaos Athanasiou¹, Vasileios Vlachakos², Paschalis Steiropoulos³, Alexandros Vgontzas¹, Georgia Trakada²

¹Penn State College of Medicine, ²National and Kapodistrian University of Athens Medical School, ³Democritus University of Thrace, Medical School

Introduction: Comorbid insomnia and obstructive sleep apnea (COMISA) represent a common yet frequently under-recognized clinical phenotype, characterized by a heightened symptom burden and impaired quality of life compared with obstructive sleep apnea (OSA) alone. Growing evidence indicates that the coexistence of insomnia symptoms may exacerbate daytime dysfunction, psychological distress, and treatment non-adherence. However, data from Mediterranean populations remain limited. This study aimed to evaluate key daytime symptoms—sleepiness and fatigue—and the psychological profile of patients with COMISA in a Greek clinical population, factors known to influence prognosis and therapeutic engagement.

Methods: Data were collected from three Sleep Medicine Clinics of University hospitals. Participants underwent either laboratory polysomnography or home sleep testing and completed validated questionnaires: the Epworth Sleepiness Scale (ESS) for daytime sleepiness, Fatigue Severity Scale (FSS) for fatigue, Athens Insomnia Scale (AIS) for insomnia symptoms, and the Hospital Anxiety and Depression Scale (HADS-A/HADS-D) for psychological distress. OSA was defined as apnea-hypopnea index (AHI) ≥ 5 , insomnia as AIS ≥ 6 , and COMISA as the presence of both criteria. Comparative statistical analyses were performed between the OSA and COMISA groups.

Results: A total of 407 patients with COMISA (56.3% male; median age 55 years, IQR:46–65) and 218 with OSA (65.6% male; median age 58 years, IQR:48–66) were included. Significant differences were observed in age and sex distribution. COMISA patients exhibited markedly higher rates of excessive daytime sleepiness (EDS) (40.5% vs. 17.9%, $p < 0.001$), severe fatigue (63.6% vs. 25.7%, $p < 0.001$), and increased prevalence of clinically significant anxiety (45% vs. 12.4%, $p < 0.001$) and depressive symptoms (48.6% vs. 18.3%, $p < 0.001$) compared with the OSA group.

Conclusion: Findings demonstrate that COMISA is associated with substantial daytime symptomatology and psychological distress, exceeding that seen in OSA alone. Individuals with insomnia and OSA show high rates of EDS and fatigue that in contrast to OSA alone appear to be a result of psychological distress and less the impact of COMISA on objective indices of sleep disturbance. These observations highlight COMISA as a distinct and clinically complex phenotype. A more holistic and individualized approach—integrating sleep-focused, behavioral, and psychological interventions—may improve diagnostic accuracy, treatment adherence, and overall outcomes.

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1027

EXPLORING THE ASSOCIATION BETWEEN GASTROESOPHAGEAL REFLUX DISEASE AND POSITIONAL OBSTRUCTIVE SLEEP APNEA IN A TAIWANESE GENERAL POPULATION

Yung-Hsuan Chen, Wei-Chung Hsu, Duen-Lii Hsieh, Hung-Ju Lin, Han-Mo Chiu, Ming-Shiang Wu, Ping-Huei Tseng
National Taiwan University Hospital

Introduction: Positional obstructive sleep apnea (POSA), a subtype of OSA, is characterized by higher apnea-hypopnea index (AHI) in the supine position. Gastroesophageal reflux disease (GERD) is common among OSA patients and may worsen sleep quality, yet the interaction between POSA and GERD remains unclear. This study aims to investigate the clinical association between POSA and GERD, focusing on GERD severity and its impact on sleep quality and sleep metric differences.

Methods: Participants undergoing self-paid health evaluations, including an overnight cardiopulmonary coupling (CPC) testing with pulse oximetry, at the National Taiwan University Hospital Health Management Center from 2022 to 2023 were enrolled. GERD severity was assessed using the Los Angeles (LA) classification for erosive esophagitis (EE) and the Reflux Disease Questionnaire (RDQ). Sleep parameters, including AHI, positional differences, and desaturation indices, were obtained from CPC. POSA was defined as AHI-supine/AHI-non-supine ≥ 2 with at least 15 minutes of non-supine sleep.

Results: A total of 425 participants were analyzed. Among them, 205 (48.2%) had EE (LA Grade A/B/C/D: 183/19/2/1). Additionally, 97 participants (22.8%) had AHI ≥ 15 on CPC testing. After applying the ≥ 15 -minute non-supine time criterion, 76 were classified as POSA and 8 as non-POSA. POSA participants had lower AHI (27.3 $\pm$ 8.6 vs. 39.4 $\pm$ 16.9, $p = 0.001$), T90% (4.8 $\pm$ 6.2 vs. 11.2 $\pm$ 13.0, $p = 0.017$), and ESS scores (4.7 $\pm$ 3.0 vs. 7.3 $\pm$ 3.5, $p = 0.031$). EE prevalence (81.6% vs. 87.5%, $p = 1.000$), EE severity ($p = 0.607$), RDQ scores (3.4 $\pm$ 4.8 vs. 2 $\pm$ 3.4, $p = 0.417$), and PSQI scores (5.1 $\pm$ 2.1 vs. 5.4 $\pm$ 2.9, $p = 0.771$) were similar between POSA and non-POSA groups. Among POSA participants, those with EE were younger (54.8 $\pm$ 9.2 vs. 60.8 $\pm$ 8.2 years, $p = 0.027$), but no significant differences were observed in BMI, neck circumference, AHI severity, or desaturation.

Conclusion: In this study, GERD prevalence and severity did not differ between POSA and non-POSA participants. Younger POSA participants were more likely to have EE. Further studies are needed to clarify the complex relationship between GERD and POSA and provide insights of tailored management strategies.

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1028

INSOMNIA AND SLEEP CHARACTERISTICS IN THE EARLY RECOVERY PERIOD AFTER ILEOSTOMY SURGERY

Stacy Al-Saleh¹, Akiko Okano², Melanie Schneekloth², Jenna Sime², Samantha Conley²

¹Mayo Clinic Arizona, ²Mayo Clinic Minnesota

Introduction: Individuals with ostomies commonly report poor sleep quality years after ostomy surgery; however, little is known about the trajectory of insomnia and objective sleep characteristics in the early postoperative period. The purpose of this study was to describe the trajectory of insomnia and sleep characteristics in the first 3 months following ileostomy surgery.

Methods: We conducted a prospective, observational feasibility study of adults (18-65 years) undergoing ileostomy surgery. Sleep characteristics were obtained via Garmin smartwatches (vivosmart[®] 5) worn from 2 weeks to 3 months postoperatively. The Insomnia Severity Index (ISI) was used to elicit insomnia severity perioperatively and at postoperative months 1, 2, and 3. Descriptive and univariate statistics were used.

Results: We enrolled 22 participants [Mean age 41.55 years (SD 10.77), 10 female (45.5%), 19 White (86.4%), 9 colorectal cancer (40.9%), and 8 inflammatory bowel disease (36.3%)]. There was little change in insomnia severity from the perioperative period (mean = 9.95, SD 5.57) to 3 months after surgery ($\Delta = 0.76$). At the time of ostomy surgery, most participants ($n = 13$, 59.1%) had insomnia ($ISI \geq 8$). Fifteen participants completed the postoperative surveys. Of those, 2 participants (13.3%) experienced resolution of insomnia symptoms, 3 participants (20%) continued to report no insomnia symptoms, 5 participants (33.3%) developed new insomnia symptoms, and 5 (33.3%) experienced persistent insomnia symptoms. There was little change in sleep duration ($m = 462.10$ min, $SD = 79.07$, $\Delta = -24.1$), deep sleep ($m = 81.21$ min, $SD = 16.97$, $\Delta = -8.01$), light sleep ($m = 297.93$ min, $SD = 44.26$, $\Delta = -3.93$), REM sleep ($m = 82.82$ min, $SD = 44.50$, $\Delta = -12.02$), wake after sleep onset ($m = 51.87$ min, $SD = 29.93$, $\Delta = -3.05$), or sleep score out of 100 ($m = 59.15$, $SD = 11.83$, $\Delta = -1.74$) from month 1 to month 3 after surgery.

Conclusion: Individuals undergoing ileostomy surgery experience symptoms of insomnia which often persist throughout the early postoperative period. Future research should explore the impact of insomnia on ostomy outcomes and should test interventions to treat insomnia in the early postoperative period.

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1029

INSOMNIA, SLEEP APNEA AND INCIDENT DIABETES AMONG U.S. MILITARY VETERANS

Karam Al Jumaily¹, Allison Gaffey¹, Andrey Zinchuk², Brian Wojcick²

¹Yale School of Medicine, ²Yale University

Introduction: Type 2 diabetes mellitus (T2DM) is a major contributor to morbidity, mortality, and healthcare utilization in the U.S., including among patients served by the Veterans Health Administration (VA). Insomnia and obstructive sleep apnea (OSA), two most common sleep disorders, are each independently linked to metabolic dysfunction via glucose dysregulation. Individuals with comorbid insomnia and OSA (COMISA) may experience greater metabolic risk; yet, most prior work focused on older, community-based samples and data from young or middle-aged adults, especially Veterans, remain scarce. Importantly, the disorders often present differently in men and women and it is unknown if the sleep-T2DM also differ.

Methods: We conducted secondary data analyses of a cohort study of 1,075,720 U.S. Veterans (Mage: 33.8 years, 12% women) without baseline sleep disorders or T2DM. Participants were followed from first VA encounter until first T2DM diagnosis, death, last VA encounter, or administrative censoring. Inpatient/outpatient records, ICD-9/10 codes, and pharmacy data were merged. Incident T2DM was identified using laboratory values, clinical encounters, or antihyperglycemic medication use. Insomnia, OSA and COMISA were defined using ICD codes and were modeled as time-varying exposures. Cox proportional hazards models for T2DM were conducted in the entire cohort and by sex, adjusting for demographics, body mass index, smoking, hypertension, hyperlipidemia, psychiatric conditions, and substance use.

Results: Insomnia and OSA were each independent predictors of incident T2DM. Insomnia alone was associated with a significantly increased risk for T2DM (HR-overall: 1.36, men: 1.33; women: 1.47). OSA alone conferred a higher risk (HR 5.47 overall; 5.68 men; 3.81 women). COMISA had the greatest risk, with HRs of 6.2 overall, 6.5 in men, and 4.7 in women, compared to neither disorder. The Insomnia-x-OSA interaction was significant ($p \leq 0.001$), indicating COMISA's metabolic risk reflects a synergistic amplification rather than the additive effects of each disorder.

Conclusion: Among younger Veterans, COMISA was associated with a markedly elevated risk of new-onset T2DM, substantially exceeding the risk associated with insomnia or OSA alone and observed in both men and women. These findings highlight COMISA as a key sleep phenotype and underscore the potential importance of early identification of sleep disorders as part of diabetes prevention in high-risk populations.

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1030

MODERATE-TO-SEVERE OBSTRUCTIVE SLEEP APNEA IS ASSOCIATED WITH ELEVATED PROSTATE-SPECIFIC ANTIGEN LEVELS: INSIGHTS FROM THE EPISONO COHORT

Allan Porcaccia¹, Monica Andersen², Gabriel Pires¹, Sergio Tufik¹

¹Universidade Federal de São Paulo, ²Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Prostate cancer ranks as the 2nd most frequently diagnosed malignancy among men, with prostate-specific antigen (PSA) serving as its primary diagnostic biomarker. Growing evidence suggests a potential link between malignancies and obstructive sleep apnea (OSA), the leading sleep disorder besides insomnia. This study aimed to investigate the relationship between serum total PSA concentrations and OSA.

Methods: A cross-sectional observational study was conducted using data from men aged over 50 years participating in the 4th São Paulo Epidemiological Sleep Study (EPISONO; 769 participants). OSA diagnosis was established through overnight type I polysomnography. The primary endpoint was serum total PSA level. Covariates included age, body mass index (BMI), OSA severity, proportion of total sleep time with oxygen saturation below 90% (T90), and serum concentrations of total testosterone and estradiol.

Results: The analytical subsample comprised 111 participants, with a mean age of 61.7 years and an average BMI within the overweight classification. After adjustment for BMI and T90, individuals with moderate-to-severe OSA exhibited significantly increased odds of having clinically elevated total PSA levels (≥ 4.0 ng/mL). Higher estradiol concentrations were inversely associated with total PSA, indicating a potential protective influence, whereas total testosterone showed no significant correlation. These associations remained stable in a sensitivity model excluding T90.

Conclusion: Moderate-to-severe OSA was independently associated with elevated total PSA levels in men aged over 50 years, emphasizing the relevance of sleep-disordered breathing in prostate cancer screening. Increased estradiol concentrations appeared to mitigate PSA elevation, suggesting a modulatory role of sex hormones. These results reinforce the need to incorporate sleep evaluations into standard clinical assessments to enhance early detection and individualized management.

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1031

OBJECTIVE-SUBJECTIVE DISCREPANCY IN SLEEP ASSESSMENT IN OSA PATIENTS WITH A HISTORY OF TINNITUS

Olivia Lazan, Nayana Williams, Jeremy Weingarten, Boris Dubrovsky, John Cunningham

New York-Presbyterian Brooklyn Methodist Hospital

Introduction: Approximately 50-70% of tinnitus patients report disturbed sleep and insomnia on PSQI and ISI. However, a PSG evaluation showed higher total sleep time (TST) and N3% and lower total arousal index (TAI) and AHI in a tinnitus group compared to no-tinnitus. This study explores reasons for mismatch between objective and subjective sleep in tinnitus patients evaluated for OSA.

Methods: From 2001 consecutive diagnostic PSGs, we selected 118 patients without major medical or psychiatric history who reported tinnitus on a screener questionnaire (61 women, 43 Caucasian, M[Age]=48.2±15.6). Tinnitus Handicap (TH) Inventory yielded 4 scores: Functional-TH, Emotional-TH, Catastrophic-TH, Total-TH. Objective-subjective mismatch indices (MI=[objective-subjective]/objective) were calculated for PSQI reports of habitual TST, sleep latency (SL) and sleep efficiency (SE), and for post-PSG self-reports of in-lab TST, SL and WASO. MIs were outcomes in multiple regressions. Predictor variables were: objective TST, SL, SE, N1%, N3%, REM%, REM latency, WASO, #awakenings, total arousal index (TAI), AHI, SpO₂nadir, self-reported PSQI-Global, ISI, ESS, Center for Epidemiologic Studies Depression Scale-Revised (CESDR), TH scores. Age, sex, BMI were covariates.

Results: Greater underestimation of TST on PSQI was predicted by lower Functional-TH ($p=0.006$), higher Emotional-TH ($p=0.015$), higher N3% ($p=0.039$), higher objective-SE ($p=0.043$), more objective awakenings ($p=0.012$), higher PSQI-Global ($p<0.001$). Greater post-PSG underestimation of TST was predicted by higher Emotional-TH ($p=0.052$), lower Catastrophic-TH ($p=0.006$), longer REM latency ($p=0.006$), lower objective-WASO ($p=0.001$), lower objective-SE ($p=0.028$), shorter objective-SL ($p=0.005$). Greater PSQI overestimation of SL was predicted by higher objective-WASO ($p=0.026$), higher objective-SE ($p=0.021$), higher PSQI-Global ($p=0.001$), lower ISI ($p=0.019$). Greater post-PSG overestimation of SL was predicted by higher objective-WASO ($p=0.004$), higher objective-SE ($p=0.011$), lower N1% ($p=0.037$). Greater PSQI underestimation of SE was predicted by shorter objective-SL ($p=0.026$), longer REM latency ($p=0.043$), higher PSQI-Global ($p<0.001$). Post-PSG estimation of WASO did not relate to any predictor variables.

Conclusion: Three aspects of tinnitus handicap contributed to objective-subjective mismatch in TST. Overall, MIs showed inconsistent relationships with objective and subjective sleep variables, which should be clarified in future studies. There were no relationships of MIs with depression symptoms. Associations of PSQI-Global with several MIs suggest a cautious interpretation of self-reported sleep disturbance in tinnitus patients.

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1032

OBSTRUCTIVE SLEEP APNEA IS ASSOCIATED WITH NUTRITIONAL BIOMARKERS DISTURBANCES IN EUTROPHIC INDIVIDUALS: FINDINGS FROM THE EPISONO COHORT

Bianca Schimenes¹, Tathiana Alvarenga², Priscila Morelhão², Sergio Brasil Tufik², Sergio Tufik¹, Monica Andersen³

¹Universidade Federal de São Paulo, ²Instituto do Sono, Associação Fundo de Incentivo à Pesquisa, ³Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Unhealthy dietary patterns contribute to chronic disease risk and may influence sleep quality, including the development and severity of obstructive sleep apnea (OSA). While most studies have focused on overweight or obese populations, the influence of nutritional status in eutrophic individuals with OSA remains underexplored.

Methods: Unhealthy dietary patterns contribute to chronic disease risk and may influence sleep quality, including the development and severity of obstructive sleep apnea (OSA). While most studies have focused on overweight or obese populations, the influence of nutritional status in eutrophic individuals with OSA remains underexplored. **Methods:** This is a cross-sectional study. Data were obtained from the EPISONO 4th edition, a population-based study conducted between 2018 and 2019. 769 participants aged 20-80 years underwent polysomnography, blood sample analysis, and lifestyle questionnaires. It was performed Kruskal-Wallis analysis to assess differences in medians between nutritional biochemical markers and OSA severity and linear regression for associations between nutritional biochemical markers and apnea-hypopnea index (AHI).

Results: Out of the 769 participants initially evaluated, 23.9% were eutrophic adults. The sample included 184 men (42.9%) and women (57.1%) aged 20-59 years within the eutrophic range

according to the body mass index (BMI) (18.5 to 24.9kg/m²). For the statistical analysis, individuals were stratified by OSA severity and controlled for sex and age. They were further categorized into 3 groups according to OSA severity: no OSA, mild OSA, and moderate-to-severe OSA. Individuals with moderate-to-severe OSA exhibited higher concentrations of very-low-density lipoprotein and triglycerides compared with those without OSA. Increasing OSA severity was associated with lower zinc levels, with moderate-to-severe OSA presenting reduced concentrations compared with mild OSA. Linear regression analysis further revealed that higher AHI values were linked to increased concentrations of transferrin, and to decreased magnesium levels.

Conclusion: OSA is associated with alterations in nutritional biochemical markers in eutrophic individuals, suggesting that these differences, independent of obesity, may reflect dietary patterns and underscore the need for integrative management approaches for this sleep disorder.

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1033

QUALITY IMPROVEMENT IN THE IDENTIFICATION AND MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA IN PATIENTS WITH HYDROCEPHALUS

John Lin¹, Laiheng Maldonado¹, Naomi Abel², Hannah Fitterman-Harris³, Elizabeth Rivera³, McDowell Anderson¹

¹USF Morsani College of Medicine, ²USF Health Department of Neurosurgery, Brain, and Spine, ³USF Morsani College of Medicine/Tampa General Hospital Psychology

Introduction: Obstructive sleep apnea (OSA) is highly prevalent in idiopathic normal-pressure hydrocephalus (INPH), with studies reporting rates as high as 90%. Similar concerns exist for idiopathic intracranial hypertension (IIH). OSA may worsen headache burden, gait instability, and cognitive dysfunction in these patients. This quality improvement initiative evaluates the referral pathway from USF Neurosurgery to the USF Sleep Disorders Center to identify barriers to timely OSA diagnosis and management.

Methods: A baseline retrospective review was performed on 13 adults with hydrocephalus or IIH referred for outpatient sleep evaluation between 2024–2025. Eleven referrals were placed during outpatient neurosurgery visits, one during inpatient admission, and one by a non-neurosurgical service. The latter was excluded from neurosurgery-specific timing metrics but included in overall outcomes. Measures included Sleep Medicine consultation, completion of polysomnography/home sleep apnea testing (PSG/HSAT), OSA diagnosis, and PAP initiation. Time intervals were summarized using medians and interquartile ranges (IQR).

Results: Among 11 patients with outpatient referral timing data, referrals were typically placed at point of care (median 0 days; IQR 0–0; range 0–36). Sleep Medicine consultation was completed in 11/13 patients, with a median delay of 108.5 days (IQR 58–139; range 26–433), representing the primary bottleneck. Diagnostic testing was completed in 7/13 patients, with a median time of 130 days from referral to PSG/HSAT (IQR 100.5–150.5; range 46–209). Among 6/13 patients who completed both consultation and

testing, the median time from consultation to PSG/HSAT was 21.5 days (IQR 20–27; range 19–63), indicating shorter delays once evaluated. OSA was diagnosed in 3/7 patients (43%), and 2/3 (67%) of those diagnosed initiated PAP therapy. Delays between Sleep Medicine referral and consultation was the largest contributor to pathway attrition.

Conclusion: Despite referrals occurring at the time of neurosurgical assessment, prolonged delays before Sleep Medicine evaluation limited timely OSA diagnosis. Planned interventions include a structured decision-support screening and referral algorithm and centralized tracking through Somnoware to improve workflow reliability and accelerate time-to-diagnosis. Continued data collection and evaluation of pathway performance will be conducted as interventions are implemented.

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1034

RACIAL/ETHNIC DIFFERENCES IN CANNABIS USE DISORDER AMONG SLEEP-MOTIVATED CANNABIS CONSUMERS ACROSS TWO AGE-DISTINCT COHORTS

Ciné Brown¹, Bria-Necole Diggs², Amrit Baral³, Girardin Jean-Louis², Denise Vidot²

¹Sylvester Comprehensive Cancer Center, ²University of Miami, ³Johns Hopkins University

Introduction: As cannabis legalization and availability expand, sleep-motivated cannabis use is increasing, yet little is known about how sleep-motivated cannabis use relates to cannabis use disorder (CUD) across race-ethnicity. This analysis aimed to examine patterns of sleep-related cannabis use and their association with CUD across two age-diverse cohorts in South Florida.

Methods: We utilized harmonized data from two ongoing cohort studies: Herbal Heart Study's Sleep Ancillary Study (HSS; N=150; young adults) and the Canna-ESSENTIAL study (CE; N=60; middle-aged adults). Self-reported data on cannabis use were ascertained using the Sleep & Substance Usage Questionnaire. Cannabis Use Disorder Identification Test-Revised (CUDIT-R) was used to observe cannabis use disorder (CUD; score of 12+) and hazardous use (score from 8-11). Chi-square and Fisher's exact tests were conducted where appropriate.

Results: Of the total sample (N=210; Mage=30.4±10.9 years), 71.4% were young adults (Mage=25.6y), 28.6% middle-age adults (Mage=42.6y), 39.9% Non-Hispanic Black (NHB), 38.4% Hispanic, and 13.8% Non-Hispanic White (NHW). Over half (60.0%) of participants consumed cannabis in the past year, of which 39.3% of young adults and 15.0% of middle-aged adults were found to have CUD (p<.0001). A majority of consumers (68.3%) reported consuming to improve their sleep quality, and 59.5% for duration. Among those consuming for sleep quality and/or duration, there were significant differences in CUDIT-R by race/ethnicity: 51.4% of NHB, 68.4% of Hispanics, and 44.4% of NHW with CUD. Likewise, hazardous cannabis use was observed among 44.4% of NHW, 5.7% of NHB, and 13.2% of Hispanic (p=0.008). Notably, 100.0% young adults reported consuming cannabis in the evening compared to 86.4% of middle-aged adults (p=0.01); and afternoon use was more common among Hispanics (65.8%) than among NHB (45.7%) or NHW participants (22.2%; p=0.04).

Conclusion: Cannabis use for sleep was frequent and associated with CUD and hazardous use, exhibiting racial-ethnic differences.

These results underscore the importance of CUD screening and culturally tailored harm-reduction education for sleep-related cannabis consumers.

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1035

ROLES OF SLEEP COREGULATION IN LONGITUDINAL NEUROENDOCRINE FUNCTIONING AMONG PATIENTS WITH COLORECTAL CANCER AND THEIR SPOUSES

Youngmee Kim¹, Jamie Zeitzer², Robert Moulder³, Armando Mendez⁴, Thomas Tsai¹, David Spiegel⁵

¹University of Miami, ²Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, ³University of Colorado, ⁴University of Miami School of Medicine, ⁵Stanford University

Introduction: Sleep disturbance in adults with cancer and their caregivers is a significant yet understudied health concern. Couples often influence one another's sleep through psychological and physiological aspects of their relationship. This study examined how sleep coregulation between patients and their spousal caregivers relates to changes in their neuroendocrine functioning over time.

Methods: Patients with colorectal cancer and their spouses (137 dyads; 56.15 years old, 32.9% female patients, 69.1% advanced cancer, 7 months post-diagnosis) completed questionnaires assessing relationship duration, social constraint, and relationship quality with the partner at the initial assessment (T1). Participants also completed 14 consecutive days of sleep logs at T1. Using continuous-time structural equation modeling, we calculated sleep coregulation indices (SCIs), reflecting the extent to which one partner's sleep efficiency (SE) on a given day predicted the other partner's SE on subsequent days. Participants provided saliva samples 2-4 times daily for 7 days at T1 and one year later (T2) to derive diurnal cortisol slopes at T1 and T2. Covariates included age, BMI, and T1 cortisol slope.

Results: Both patients and caregivers reported poor sleep efficiency ($M=82.9\%$). Only caregivers exhibited significantly flatter diurnal cortisol slopes (worse neuroendocrine functioning) at T2 compared with T1 ($p<.003$). Patients' steeper (healthier) T2 cortisol slope was associated with higher relationship quality ($p=.01$). It also tended to be negatively associated with greater SCI when their caregivers' SE predicted patients' subsequent SEs, whereas it was positively associated with greater SCI when patient's own SE predicted their caregiver's subsequent SEs ($p\leq.063$). In contrast, caregivers' steeper T2 cortisol slope was negatively associated only with their greater dependence on the patient ($p=.006$).

Conclusion: Findings provide preliminary support that high-quality relationships and synchrony in caregivers' sleep patterns may benefit patients' neuroendocrine functioning over time, whereas greater relationship dependency may be detrimental for caregivers. Results underscore the need for dyadic sleep interventions that jointly address patients and their sleep-partner caregivers and incorporate dyadic coping skills to promote healthy interdependence and relationship satisfaction. Larger studies investigating additional interpersonal and medical factors influencing sleep coregulation in couples coping with cancer are warranted to guide future research and clinical practice.

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1036

RURAL HEALTH CANCER JOURNEY: EXPERIENCES OF STRESS AND SLEEP

Patricia Carter

The University of Texas Medical Branch Galveston, School of Nursing

Introduction: Cancer is an unpredictable journey, and patients often experience side-effects from intensive therapies (e.g., nausea, dyspnea, cachexia, etc.) after leaving the treatment center. Rapid identification and treatment of side-effect symptoms is preferred. Rural family caregivers are tasked with patient symptom management at home often several miles (multiple hours) drive from medical services. Additionally, family caregivers report increased sleep fragmentation and prolonged sleep latency that may impact awareness of and confidence in managing patient symptoms. Poor symptom management has resulted in as many as 50% of patients delaying or refusing potentially lifesaving cancer treatments. This study explored the influence of sleep, mood, and perceived stress on family caregiver confidence in managing patient symptoms at home.

Methods: Caregivers and patients were recruited at a rural oncology clinic in a south-eastern state of the US. Each dyad completed the PSQI and ISI, PHQ-9, GAD-7, PSS during a single clinic visit. Additionally, family caregivers reported patient symptoms and their management confidence, while patients completed the FACT-G.

Results: 50 patients and 46 family caregivers participated in the study. Individually, family caregivers and patients reported moderate to severe PSQI, ISI, PhQ-9, GAD-7, and PSS scores. Patients generally reported worse anxiety, depression, and insomnia symptoms, while family caregivers reported slightly higher perceived stress. Significant correlations were observed between dyad members, with perceived stress (PSS) being the strongest [$r=0.59$, $p<0.001$] and depressive symptoms (PhQ-9) being the weakest [$r=0.35$, $p=0.017$]. Multiple linear regression revealed a significant amount of the variance in family caregivers' symptom management confidence was accounted for by the combined sleep, anxiety, depression, and perceived stress predictors [$R=0.61$, $R^2=0.37$, $F(5, 37)=4.37$, $p=0.003$, adjusted $R^2=0.29$].

Conclusion: Patients and family caregivers experience the cancer journey together. However, each member of the dyad reflects different impacts along the journey. Individual and dyadic experiences must be considered when developing interventions. Rural family caregivers must receive increasing support as patient symptom complexity increases to avoid negative outcomes from poor symptom management at home.

Support (if any): Intra-mural university funding

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1037

SLEEP DISORDERS AND ERECTILE DYSFUNCTION: LONGITUDINAL AND CROSS-SECTIONAL FINDINGS FROM THE EPISONO STUDY

Monica Andersen¹, Allan Porcaccchia², Fernandes Guilherme², Tathiana Alvarenga³, Sergio Tufik²

¹Departamento de Psicobiologia, Universidade Federal de São Paulo, ²Universidade Federal de São Paulo, ³Instituto do Sono, Associação Fundo de Incentivo à Pesquisa

Introduction: An increasing number of studies have explored the link between sleep disturbances and erectile dysfunction (ED). This work reports findings from the 2015 follow-up of the Epidemiologic Sleep Study (EPISONO) conducted in São Paulo, Brazil, comparing results from its 3rd and 4th editions (2007 and 2018, respectively). We examined the incidence and prevalence of ED and their association with potential determinants, including serum testosterone and obstructive sleep apnea (OSA).

Methods: Participants completed full-night polysomnography and standardized health questionnaires. Serum testosterone was also measured. The cohort included men aged 20-80 years. Longitudinal analyses calculated the incidence of ED and generalized estimating equation models were performed. Data from EPISONO 2018 were analyzed cross-sectionally through binomial logistic regression and mediation-moderation modeling.

Results: During follow-up, the incidence of ED was 10.55%, predominantly among men older than 50 years. In the longitudinal model, advancing age (odds ratio [OR]=1.09), depressive symptoms (OR=1.05), and reduced total testosterone (OR=2.69) significantly predicted ED, whereas higher psychological well-being (World Health Organization Quality of Life; OR=0.87) was protective. In the 2018 dataset, the overall prevalence of ED reached 20.06%, again higher among participants over 50. The likelihood of ED increased with age (OR=1.07), while better psychological quality of life reduced this odd (OR=0.65). Mediation analysis showed a significant indirect effect of the apnea-hypopnea index (AHI) on the relationship between age and total testosterone. When ED was set as the outcome, age retained a direct effect, but AHI did not.

Conclusion: These findings underscore the relevance of aging, depressive symptoms, testosterone levels, and psychological quality of life in the development of ED. Although it was associated with OSA, this link did not appear independent of age. From a longitudinal perspective, modifiable factors, such as mood, sleep quality, and hormonal status, represent key targets for preventive interventions to reduce ED risk over time.

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1038

SLEEP HEALTH DIMENSIONS AND PERCEIVED STRESS IN AFRICAN AMERICAN PREGNANT WOMEN

Ghada Abu Irsheed¹, Nicole Genao², Lila Siwakoti², William Edward Ackerman², Rashmika Maganuru², Lillian Borbas², Genesis Alameda², Mahrukh Shah², Nisaa Nazer², Simrah Faheem², Lauretta Quinn², Bilgay Balserak²

¹Loyola University, ²University of Illinois at Chicago

Introduction: African American pregnant women (AAPW) experience disproportionately high levels of stress. Poor sleep health has been linked to heightened stress, which can contribute to adverse maternal-fetal outcomes, including impaired glucose levels, preterm birth, low birth weight, and postpartum depression.

This study investigates the relationship between individual sleep health dimensions, multidimensional sleep health (MSH), and perceived stress during early pregnancy in AAPW.

Methods: Data from 76 AAPW enrolled in the BETTER lifestyle counseling study (NCT05234125) were analyzed. Sleep health was assessed using the Pittsburgh Sleep Quality Index (PSQI) for sleep quality, subjective alertness ratings (0-100), and Fitbit-derived measures, including sleep duration, efficiency, timing (sleep midpoint), and regularity (standard deviation of sleep midpoint). Perceived stress was measured using the Perceived Stress Scale (PSS). A composite MSH score was calculated as the sum of "good" individual sleep health dimensions. Multiple regression analyses were conducted to examine whether individual sleep dimensions and MSH scores independently predicted perceived stress levels in AAPW.

Results: Participants had a mean age of 29.79 years (SD=5.31), mean gestational age of 18.19 weeks (SD=2.77), and mean BMI of 33.12 kg/m² (SD=4.98). After adjusting for covariates, poor sleep quality ($\beta=0.48$, $p=0.007$, 95% CI: 0.134, 0.831) and lower alertness ($\beta=-0.08$, $p=0.004$, 95% CI: -0.133, -0.026) were significantly associated with higher perceived stress levels. However, MSH was not significantly associated with perceived stress, either with ($\beta=-0.39$, $p=0.467$, 95% CI: -1.471, 0.683) or without adjustment for covariates.

Conclusion: Sleep quality and alertness were significantly associated with perceived stress in AAPW, highlighting the importance of comprehensive sleep health evaluation during pregnancy. Future research should explore the longitudinal relationships between sleep health dimensions and stress throughout pregnancy, as well as investigate potential mechanisms underlying these associations.

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1039

SLEEP HEALTH AND GLUCOSE REGULATION DURING PREGNANCY: EVIDENCE FROM AFRICAN AMERICAN WOMEN

Ghada Abu Irsheed¹, Nicole Genao², Lila Siwakoti², William Edward Ackerman², Alana Steffen², Lillian Borbas², Genesis Alameda², Rashmika Maganuru², Nisaa Nazer², Arushi Virmani², Larisa Burke², Lauretta Quinn², Bilgay Balserak²

¹Loyola University, ²University of Illinois at Chicago

Introduction: Sleep health, a multidimensional construct, including quality, duration, efficiency, timing, and regularity, may influence glycemic regulation during pregnancy. African American pregnant women (AAPW) experience disproportionate sleep disturbances and metabolic risk, yet these relationships remain under-explored. This study investigates between-person and within-person associations between sleep health and glycemic outcomes in non-diabetic AAPW.

Methods: Data from 55 non-diabetic AAPW enrolled in the BETTER lifestyle counseling study (NCT05234125) were analyzed. Sleep health was assessed using the Pittsburgh Sleep Quality Index (PSQI) for sleep quality, and 7-day Fitbit-derived measures

for sleep duration, efficiency, timing (sleep midpoint), and regularity (SD of sleep midpoint). Glycemic outcomes (mean glucose, coefficient of variation [CV], and mean amplitude of glycemic excursions [MAGE]) were measured through 7-day continuous glucose monitoring. Between-person associations were examined using multivariable regression, while within-person night-to-next-day associations were tested using mixed-effects models. All models were adjusted for maternal age, gestational age, BMI, daily steps, and education.

Results: Poorer sleep quality was significantly associated with greater glycemic variability. Specifically, higher PSQI scores predicted higher CV ($\beta = 0.44$, $p = 0.005$), and MAGE ($\beta = 1.10$, $p = 0.003$). For within-person associations ($n = 51$), higher sleep efficiency predicted higher next-day mean glucose ($\beta = 0.22$, $p = 0.029$). No other sleep health dimensions were significantly associated with glycemic outcomes in either between-person or within-person models.

Conclusion: Poor sleep quality may contribute to greater glycemic variability during pregnancy, while daily sleep-glucose associations appear complex. Further research with larger, more variable samples should explore mechanisms and consider sleep health as a modifiable target for improving maternal cardiometabolic outcomes.

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1040

SLEEP TRAITS AND OBSTRUCTIVE SLEEP APNEA IN HYPOTHYROIDISM: FINDINGS FROM THE EPISONO DATABASE

Ellen Xerfan¹, Maingredy Souza¹, Paula Araujo², Daniela Rosa³, Sergio Tufik¹, Monica Andersen¹

¹Departamento de Psicobiologia, Universidade Federal de São Paulo, ²Departamento de Biorregulação, Instituto de Ciências da Saúde, Universidade Federal da Bahia, ³Departamento de Microbiologia, Imunologia e Parasitologia, Universidade Federal de São Paulo

Introduction: Thyroid regulation is essential for body homeostasis and is closely linked to sleep-wake cycle. Sleep and the hypothalamic-pituitary-thyroid axis interact bidirectionally, influencing the release of thyroid hormones. Thyroid dysfunction may share overlapping mechanisms with sleep disorders, particularly obstructive sleep apnea (OSA), as well as disrupt sleep architecture. This study aimed to investigate the association between thyroid function and sleep, particularly OSA; and to examine the impact of thyroid hormone replacement therapy on sleep characteristics in individuals with hypothyroidism.

Methods: This cross-sectional study included 761 participants of 769 individuals enrolled in the 4th São Paulo Epidemiologic Sleep Study (EPISONO). Thyroid function was assessed using measurements of thyroid-stimulating hormone (TSH), free thyroxine (FT4), and information on thyroid hormone replacement therapy. Sleep parameters and OSA diagnosis were obtained through full-night polysomnography.

Results: Hypothyroidism was identified in 12.6% of the sample. Individuals with hypothyroidism presented lower sleep efficiency, longer wakefulness after sleep onset (WASO), higher oxygen desaturation, and a higher apnea-hypopnea index. The OSA frequency in the hypothyroidism subgroup was 49.5%, with severe OSA being more prevalent (25.4%) than non-severe OSA (11.4%). TSH levels were associated with increased odds for severe OSA, even after adjustment. In parallel, severe OSA was related to more than twice the odds of hypothyroidism, suggesting a reciprocal relationship between the conditions. Among participants with hypothyroidism, those under thyroid hormone replacement therapy slept approximately 49 minutes longer and spent 22 minutes more in N3 sleep compared with those untreated.

Conclusion: The OSA prevalence among individuals with hypothyroidism was consistent with previously reported findings. Higher TSH levels were related to augmented OSA severity, and severe OSA increased the risk of hypothyroidism. Thyroid hormone replacement therapy improved sleep architecture, particularly by increasing restorative N3 sleep and total sleep duration in subjects with hypothyroidism. These findings underscore the importance of incorporating early thyroid function screening into the care of individuals with OSA and, conversely, evaluating patients with thyroid dysfunction for OSA.

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1041

SLEEP, BUT NOT PROTON PUMP INHIBITOR USE, MEDIATES REFLUX-RELATED MEMORY DECLINE: EVIDENCE FROM THE EPISONO STUDY

Vanessa Cavalcante-Silva¹, Fernandes Guilherme¹, Fernanda Haddad¹, Vânia D'Almeida¹, Sergio Tufik², Monica Andersen²

¹Universidade Federal de São Paulo, ²Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Previous research has suggested that prolonged proton pump inhibitor (PPI) use to treat reflux symptoms may be associated with a higher risk of dementia, potentially through disruptions in homocysteine (Hcy) metabolism, although the evidence remains inconclusive. This study aimed to investigate the relationships between self-reported laryngopharyngeal reflux (LPR) symptoms, PPI use, sleep quality, and memory outcomes, and to evaluate whether sleep disturbances or circulating Hcy levels mediate these associations in a population-based sample.

Methods: Data from participants of the EPISONO 2018 study were analyzed, including individuals with and without LPR symptoms. Memory performance was assessed using the Prospective and Retrospective Memory Questionnaire (PRMQ). Sleep quality and insomnia severity were evaluated with the Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI). Plasma concentrations of cobalamin, folate, and Hcy were measured. Mediation analyses were conducted to determine whether sleep

disturbances or variations in the Hcy metabolic pathway contributed to the associations between LPR symptoms and memory outcomes.

Results: LPR symptoms were linked to poorer memory performance, with indirect effects partially mediated by sleep quality (7.3%) and insomnia (18.7%). No mediating role of Hcy was identified. Individuals reporting LPR symptoms without PPI use demonstrated worse PRMQ scores, and participants with LPR, regardless of PPI use, showed poorer PSQI scores. Elevated ISI scores were observed in both the LPR/no-PPI use group and the no-LPR/PPI use group.

Conclusion: Self-reported LPR symptoms are associated with diminished memory performance, and this relationship is partly explained by sleep disturbances. These findings highlight the importance of assessing and addressing sleep problems in individuals presenting with LPR.

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1042

SOCIAL DETERMINANTS OF SLEEP HEALTH INEQUITIES AMONG RURAL ADULTS

Mairead Moloney¹, Emily Slade², Joon Chung¹, Maliha Mehnaz Mitu², Michael Grandner³, Daniela Moga²

¹University of Miami Miller School of Medicine, ²The University of Kentucky, ³University of Arizona

Introduction: Sleep deficiencies—including insufficient sleep duration, poor sleep quality, and clinical sleep disorders such as insomnia and obstructive sleep apnea (OSA)—represent a significant public health burden, particularly among populations experiencing health inequities. Rural Appalachian communities comprise a federally designated health disparity population with documented geographic "hotspots" of insufficient sleep, yet the prevalence of clinical sleep disorders and their social determinants remain poorly characterized. This study examines sociodemographic, health behavior, and psychosocial correlates of three sleep outcomes (insufficient sleep duration, insomnia, and obstructive sleep apnea risk) among rural Appalachian adults.

Methods: We analyzed cross-sectional baseline survey data (2023-2025) from the Researching Equitable Sleep Time in Kentucky Communities (REST-KY) study conducted across twelve economically distressed counties in Eastern Kentucky. Eligible participants were English-proficient adults ages 18+ recruited using convenience sampling. Primary outcomes were clinically significant insomnia (Insomnia Severity Index score ≥ 10), elevated OSA risk (STOP-Bang score ≥ 3), and insufficient sleep duration (< 7 hours). Well-validated scales assessed sociodemographics, health behaviors (alcohol use, smoking, diet quality, physical activity, medication use, BMI), and psychosocial factors (social support, trauma, stress, anxiety/depression). We examined bivariate associations using Fisher's exact tests ($P < .05$).

Results: Among 327 participants, sleep deficiency rates substantially exceeded national estimates: 64.9% had clinically significant insomnia (vs. $\sim 10\%$ nationally), 51.3% had elevated OSA risk (vs. $\sim 38\%$ nationally), and 44.8% had insufficient sleep (vs. $\sim 35\%$ nationally). Insomnia prevalence showed a steep socioeconomic gradient, declining from 82.9% among participants earning $< \$20,000$ annually to 44.4% among those earning $> \$100,000$ ($P < .001$). Insomnia was significantly associated with female sex, non-full-time employment, living alone, cigarette use, poor diet quality, lower social support, poor self-rated health, polypharmacy, trauma history, anxiety/depression, and high stress. Elevated OSA risk was associated with older age, male sex, cigarette use, higher BMI, poor self-rated health, polypharmacy, and trauma history. Insufficient sleep was associated with lower social support.

Conclusion: Rural Appalachian adults experience substantially elevated rates of sleep deficiencies compared to national estimates, with distinct sociodemographic and health profiles across sleep conditions. These findings demonstrate the need for targeted, equity-focused interventions addressing social determinants of sleep health in this underserved population.

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1043

SUBJECTIVE SLEEP QUALITY IN PULMONARY REHABILITATION PATIENTS: AN UPDATE

Madeleine Basist, Sara Khan, Jon Javor, Harly Greenberg, Stella Hahn, Arunabh Talwar
Northwell Health

Introduction: The impact of pulmonary rehabilitation on subjective sleep quality is not well established. The Pittsburgh Sleep Quality Index (PSQI) is a validated questionnaire that assesses levels of sleep disturbance over a one-month period. We describe updated subjective sleep quality outcomes measured through PSQI questionnaires in patients enrolled in a pulmonary rehabilitation program at Northwell Health.

Methods: All new pulmonary rehabilitation patients at Northwell Health Pulmonary Rehabilitation in New Hyde Park, NY were invited to participate. Subjects participated in the standard pulmonary rehabilitation program (3 times weekly for 8 weeks with a total of 24 sessions). The PSQI questionnaire was completed at sessions 1, 12, and 24. Demographic and clinical characteristics were summarized using counts and percentages for categorical variables, and either mean and standard deviation or median and interquartile range for numeric variables, as appropriate. Differences between baseline and post-intervention PSQI scores were computed to estimate change at different time points and reported as medians and interquartile ranges and were compared using Wilcoxon Signed Rank tests less than or equal to 0.05 level.

Results: 67 subjects were included in this analysis. 56% of subjects were female with mean age of 68 years ($SD \pm 10.97$) and BMI 28.73 ($SD \pm 6.97$). 44% of subjects were male with mean age of 71 years ($SD \pm 7.95$) and BMI 29.79 ($SD \pm 6.62$). Comorbid conditions included COPD (53.73%), ILD (40.30%), pulmonary hypertension (14.93%), and obstructive sleep apnea (37.31%). Total PSQI scores

and subscores were analyzed. The PSQI total score improved from a mean of 7.68 at session 1 to 6.79 at session 24 ($p=.0282$). The variable with the most significant change was the daytime dysfunction subscore, which improved from session 1 to 12 ($p=.0116$) and session 1 to 24 ($p=0.0054$).

Conclusion: Pulmonary rehabilitation is an effective intervention to improve sleep quality. Our analysis suggests that pulmonary rehabilitation improves overall quality of sleep and daytime dysfunction due to sleepiness in patients with advanced lung disease. Further investigation is needed to assess long-term impacts of this intervention.

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1044

IMMUNE DYSREGULATION IN SLEEP DEPRIVATION: A LITERATURE REVIEW ON INFLAMMATORY ACTIVATION, INFECTION RISK, AND PUBLIC HEALTH IMPLICATIONS

Nidhi Perla

University of South Florida

Introduction: Sleep is essential for metabolic, cognitive, and immunological homeostasis. Strong evidence has emerged over the past decade which quantifies the impact of chronic sleep deprivation and poor sleep quality on healthy immune functioning. In contrast, how sleep deprivation may increase susceptibility to infection is less well-known. Herein, we review literature about how acute and chronic sleep deprivation affects immune cells, inflames bodies, and makes humans susceptible to viral and bacterial infections.

Methods: We searched PubMed, Scopus, and Google Scholar using keywords sleep deprivation, immune function, cytokines, and infection risk across 2013-2025. We prioritized controlled laboratory studies, epidemiological population studies, and mechanistic reviews corroborating the findings of epidemiological studies. Studies were excluded if they focused on cognitive performance, psychiatric disorders, or circadian disruption, without immune endpoints.

Results: Multiple studies have demonstrated that sleep deprivation elevates the pro-inflammatory cytokines IL-6, TNF- α , and CRP, indicating systemic inflammation in the body. Studies restricting sleep in the laboratory reduced NK cell cytotoxicity with sleep deprivation. This reduction happened as early as 24 hours of sleep loss. In large epidemiologic studies, adults reporting less than 6 hours sleep per night were 3 to 4 times more likely to develop viral upper respiratory infection after exposure to a virus than controls with well-sleeping habits. Another study found impaired adaptive immunity among other effects, including decreased antibody response to vaccination, decreased T-cell activation, and decreased immunologic memory. Insufficient chronic sleep has also been correlated with susceptibility to infection by influenza, poor recovery from infection, and hospitalization. Additionally, in several studies, structural risk factors such as shift work, low socioeconomic status, and environmental noise exposure contributed to population-level sleep deprivation and risk of infection.

Conclusion: There is substantial evidence that sleep deprivation may compromise immunity through pro-inflammatory

responses, impaired antiviral immunity and attenuated responses to vaccines, each of which appears biologically plausible. Findings support public-health efforts to reduce sleep inequity, champion sleep hygiene, promote preventive sleep education, and motivate research into the long-term impacts of poor sleep among the most risk-averse people and whether sleep interventions may provide heightened immune resilience.

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1045

SEX DIFFERENCES IN SLEEP DEFICIENCY AND TREATMENT OUTCOMES AMONG INDIVIDUALS RECEIVING METHADONE FOR OPIOID USE DISORDER

Ofure Komolafe¹, Connie Hsiao², Sangchoon Jeon³, Kimberly DiMeola⁴, Lynn Madden⁴, Klar Yaggi¹, Declan Barry²

¹Yale University, ²Yale School of Medicine, ³Yale School of Nursing, ⁴APT Foundation

Introduction: Sleep deficiency is common among individuals with opioid use disorder (OUD) and may contribute to psychiatric distress, substance use, and poor retention in treatment. Sex-specific differences in sleep health and their relationship to OUD outcomes remain poorly understood. We sought to characterize sex differences in sleep deficiency, psychological symptoms, and treatment outcomes in a large community-based opioid treatment program (OTP).

Methods: Validated measures of sleep—including the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), the first two items of the Cambridge-Hopkins Restless Legs Syndrome questionnaire (CH-RLSq), and the STOP Questionnaire—were administered to all patients at a Connecticut OTP in August 2023. Psychological symptoms were assessed using the 24-item Behavior and Symptom Identification Scale (BASIS-24). Chart-derived variables included methadone dose, number of take-home days, and treatment duration. One-year outcomes assessed in August 2024 included retention, urine toxicology, and mortality. Group differences by sex were evaluated using t-tests and chi-square tests.

Results: Methadone dose (81.62 mg men vs. 81.9 mg women, $p = 0.87$), take-home days (12.55 vs. 13.13, $p = 0.31$), and treatment duration (7.12 vs. 7.02 years, $p = 0.74$) did not differ by sex. Women reported significantly poorer sleep: higher PSQI scores (8.18 vs. 6.89, $p < 0.0001$), greater insomnia severity (ISI 9.27 vs. 7.67, $p = 0.0001$), and more restless-legs symptoms (0.68 vs. 0.52, $p = 0.0011$). STOP and ESS scores did not differ. Women also demonstrated higher BASIS-24 Depression (1.13 vs. 0.87, $p < 0.001$). Over one year, women were more likely to test positive for benzodiazepines (30.0% vs. 24.8%, $p = 0.046$), whereas men were more likely to test positive for fentanyl (34.99% vs. 28.48%, $p = 0.0185$). Treatment retention was similar ($p = 0.86$). Thirteen participants died (9 women, 4 men).

Conclusion: In this large community-based cohort of patients receiving methadone for OUD, women exhibited markedly poorer sleep quality and more depressive symptoms than men despite comparable treatment duration and retention. Over one year, more women tested positive for benzodiazepines, while more men tested positive for fentanyl.

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1046

POSITIVE AIRWAY PRESSURE THERAPY AND PNEUMONIA: AN INVESTIGATIVE CASE SERIES THROUGH SYSTEMATIC DATA REVIEW

Haesung Lee, Narat Srivali

Duke University Hospital

Introduction: Positive airway pressure (PAP) therapy is the primary treatment for sleep apnea. While effective, concerns have been raised regarding a potential association between PAP therapy and pneumonia. Understanding this association is crucial for optimizing patient care and ensuring safety.

Methods: We conducted a systematic literature review to evaluate the association between PAP therapy and pneumonia. A comprehensive search was performed in databases such as MEDLINE, EMBASE, and the Cochrane library, following PRISMA guidelines. Inclusion criteria encompassed case reports and case

series reporting PAP usage before pneumonia diagnosis, while exclusions included cases with pneumonia predating PAP usage. Data extraction and quality assessment were conducted independently.

Results: The search yielded 32 relevant articles for review. *Legionella pneumophila* emerged as the most common infecting organism, with instances of inadequate device cleaning associated with pneumonia development. Severity varied among cases, with *Legionella* cases often requiring intensive care and mechanical ventilation. Mechanisms potentially contributing to pneumonia risk with PAP therapy included aerosolization of pathogens, mucosal irritation, aspiration risk, and device contamination.

Conclusion: Our systematic review emphasizes the significance of ensuring proper infection management and device hygiene among PAP therapy recipients. However, there is a clear need for further research to clarify the underlying mechanisms to fully understand the association between PAP therapy and pneumonia.

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1047

FOSI MEDIATES NIGHTMARES AND INSOMNIA IN WOMEN WHO HAVE EXPERIENCED SEXUAL TRAUMA

Sophie Nilsson, Garrett Baber, Elijah Nichols, Anna Quesada,
Nancy Hamilton
University of Kansas

Introduction: Trauma exposure is a known risk for sleep disruption from both nightmares and insomnia. Informed by recent research proposing specific mechanisms linking trauma to sleep disruption and between nightmares and insomnia, (Werner et al. 2021), we tested a model in which the relationship between nightmares and insomnia was mediated by fear of sleep.

Methods: Study participants were college-aged women (N=497; Mage=18.9, SD=2.0) who reported a history of sexual trauma. Participants completed a one-time battery of questionnaires: Life Event Checklist (LEC), the Post Traumatic Stress Disorder Checklist-5, Civilian edition (PCL-C), the Insomnia Severity Questionnaire (ISI), the Nightmare Distress Inventory (NDI), and the Fear of Sleep Inventory (FOSI), using factor analytically derived subscales.

Results: The average PCL-C score was 47.6 (SD=15.1) with approximately 60% of the participants scoring at or above 44, indicating high prevalence of PTSD symptoms in this sample. The total effect of ISI score on NDI was significant ($t(496) = 10.76, p < 0.001$), accounting for 19% of the total variance in the ISI. The results include: FOSI vigilance mediated the association between ISI and NDI (indirect effect = 0.13, SE = 0.03, $p < 0.001$, standardized β Indirect = 0.09), accounting for 21.1% of the total effect. FOSI Fear of Darkness mediated the association between NDI and ISI (indirect effect = 0.08, SE = 0.02, $p = 0.002$, Standardized β Indirect = 0.05), accounting for 12.2% of the total effect. FOSI Fear of Nightmares mediated the association between NDI and ISI (indirect effect = 0.22, SE = 0.04, $p < 0.001$, Standardized β Indirect = 0.15) accounting for 35.6% of the total effect. FOSI Vulnerability mediated the association between ISI and NDI indirect (effect = 0.19, SE = 0.04, $p < 0.001$, Standardized β Indirect = 0.13), accounting for 30.4% of the total effect.

Conclusion: Consistent with the model proposed by Werner and colleagues, Fear of Sleep, and most prominently, Fear of Nightmares, appears to link nightmares to insomnia in this sample of young adult women reporting a history of sexual trauma. Although we have modeled nightmares upstream of Fear of Sleep, these are cross-sectional data and thus do not rule out other causal trajectories.

Support (if any):

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1048

CORTISOL AWAKENING RESPONSE PREDICTS NIGHTMARES IN COLLEGE STUDENTS: EVIDENCE FOR STRESS-PHYSIOLOGY SENSITIVITY IN DISTURBED DREAMING

Elijah Nichols¹, Nancy Hamilton¹, Michele Okun²

¹University of Kansas, ²University of Colorado, Colorado Springs

Introduction: Nightmares are emotionally intense sleep disturbances linked to impaired emotion regulation and physiological

arousal. Although stress sensitivity is theorized to increase vulnerability to nightmares, little research has examined whether specific HPA-axis indices, particularly the Cortisol Awakening Response (CAR), predict nightmare frequency in non-clinical young adults. This study evaluated whether CAR, perceived stress, and sleep quality were associated with nightmare occurrence in college students.

Methods: Participants were female college students (N=41; Mage = 22.7). Participants completed the PSQI, including the nightmare item (5h), and provided eight saliva samples across two days for cortisol assessment. CAR was computed from the first two daily samples at 30-min and 60-min post-waking. Perceived stress was measured with the Perceived Stress Scale. Nightmare frequency was coded dichotomously (any nightmare or none). Logistic regression with 1,000-sample bootstrapping tested whether CAR, perceived stress, and non-nightmare sleep disturbances predicted nightmare presence. Additional correlations and exploratory reverse models were examined.

Results: Nightmares were reported by 14.6% of participants (n=6). CAR values ranged from -1.00 to 0.65 $\mu\text{g/dL}$, with several participants showing blunted responses. CAR was significantly correlated with nightmare presence ($r = .35, p = .03$) and with global sleep disturbance ($r = .34, p = .04$). In the logistic regression model, CAR significantly predicted the presence of nightmares ($B = 4.62$, bootstrapped $p = .023$, 95% CI [0.09, 6.81]). Perceived stress and general sleep disturbances were not significant predictors. The overall model did not reach statistical significance, reflecting limited power and restricted nightmare distribution. An exploratory reverse model indicated that nightmares modestly predicted higher CAR ($\beta = .33, p = .055$; $R^2 = .164$).

Conclusion: A higher cortisol awakening response was associated with greater likelihood of reporting nightmares, suggesting that morning HPA-axis reactivity may reflect individual differences relevant to disturbed dreaming. Self-reported stress did not predict nightmares once CAR was included, indicating that biological stress reactivity may be more sensitive than subjective stress in identifying nightmare risk. Findings emphasize the value of incorporating physiological markers into nightmare research and highlight the need for longitudinal, multi-day sampling to clarify directionality and underlying mechanisms in the stress-nightmare association.

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1049

WHEN NIGHTMARES FOLLOW TRAUMA: UNDERSTANDING CONTENT, SEVERITY, AND SYMPTOM PREDICTORS

Abbey Warren, Victoria Garriques, Jose Menjivar, Wei Zhenhuan,
Michael Nadorff
Mississippi State University

Introduction: Nightmares are historically underreported despite strong links to insomnia, suicidal ideation, depression, and post-traumatic stress. Trauma-related nightmares (TRN) are central to DSM-5 PTSD criteria, yet population-level patterns of trauma-related versus non-trauma-related content remain poorly understood. Although prior work has examined the diagnostic utility of TRN, it remains unclear how commonly individuals with frequent nightmares report trauma-related themes or whether nightmares emerge or change following trauma exposure. This

study addresses these gaps by characterizing nightmare content, onset relative to trauma, and symptom correlates among individuals with clinically significant nightmares.

Methods: A total of 1,408 college students completed an online survey assessing nightmare characteristics, sleep symptoms, trauma exposure, and mental health symptoms. Measures included nightmare frequency and severity, insomnia symptoms, depressive symptoms, PTSD symptoms, trauma exposure, trauma-related nightmare content, and trauma-related nightmare onset. Analyses focused on participants experiencing nightmares at least weekly ($N = 88$).

Results: Among participants with clinically significant nightmares, 46.6% reported that their nightmares began or changed following trauma, and 46.6% reported trauma-related content. Trauma-related and non-trauma-related nightmare groups did not differ in insomnia or depressive symptoms, but those with trauma-related content reported significantly higher nightmare severity and markedly higher PTSD symptoms. A logistic regression predicting trauma-related nightmare content was significant with PTSD symptoms emerging as the only unique predictor ($\beta = .08$, $p = .007$). A multiple regression predicting nightmare severity was also significant, and PTSD symptoms were again the only significant predictor ($\beta = .61$, $p < .001$). In either regression model, trauma content, insomnia, and depression did not explain additional variance once PTSD symptoms were included.

Conclusion: Trauma-related content is not universal among individuals with clinically significant nightmares, and fewer than half report trauma-linked onset or trauma-themed imagery. PTSD symptoms uniquely distinguish trauma-related from non-trauma-related nightmares and uniquely predict nightmare severity, suggesting that PTSD-related distress plays a primary role in shaping nightmare intensity. These findings underscore the importance of assessing PTSD symptom burden when evaluating nightmare presentation, as trauma themes alone do not capture the clinical processes most closely tied to nightmare severity.

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1050

A NIGHTMARE AT THE US-MEXICO BORDER: PREVALENCE ASSOCIATED WITH ACCULTURATION, SLEEP HEALTH, AND MENTAL HEALTH – DATA FROM THE NOCHES STUDY

Alexei Kotov¹, Andrea Diaz-Pacheco¹, Patricia Molina¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: Previous research has linked nightmares to anxiety, depression, and poor sleep quality. However, much less is known about how nightmares intersect with acculturation patterns and bicultural experiences in border communities. Understanding the connection between nightmares and acculturation is especially important in contexts where cultural identity, discrimination, and cross-border living conditions may shape both psychological distress and sleep health.

Methods: Data were collected from 992 working-age adults (age 25-60) living at the US-Mexico Border. Nightmares were assessed using the item, “How often have you had trouble sleeping because you had bad dreams?” Other variables included Mexican and

Anglo acculturation as assessed by the Acculturation Rating Scale for Mexican Americans-II, Americanism, Hispanicism, and Biculturalism as assessed by the Bicultural Involvement Questionnaire, degree of perceived control over sleep (Brief Index of Sleep Control), insomnia (Insomnia Severity Index), poor sleep quality (Pittsburgh Sleep Quality Index), snoring frequency, habitual sleep duration (self-reported and actigraphic minutes/night), PHQ9 depression score, and GAD7 anxiety score. All analyses were adjusted for age and sex.

Results: Adjusted models showed nightmares sometimes (vs never) were associated with lower Americanism ($B = -3.22$, 95%CI: -5.96, -0.47), lower Anglo acculturation ($B = -0.20$, 95%CI: -0.35, -0.04), higher Mexican acculturation ($B = 0.11$, 95%CI: 0.01, 0.20), less sleep control ($B = -0.34$, 95%CI: -0.52, -0.17), worse insomnia ($B = 1.98$, 95%CI: 1.37, 2.59) and sleep quality ($B = 0.62$, 95%CI: 0.15, 1.10), more snoring (oOR=1.54, 95%CI: 1.14, 2.10), and more depression ($B = 1.25$, 95%CI: 0.68, 1.83) and anxiety ($B = 0.98$, 95%CI: 0.51, 1.46). Nightmares often (vs never) were associated with lower Americanism ($B = -6.46$, 95%CI: -10.41, -2.50), higher Biculturalism ($B = 5.76$, 95%CI: 0.75, 10.76), lower Anglo acculturation ($B = -0.28$, 95%CI: -0.50, -0.06), less sleep control ($B = -0.66$, 95%CI: -0.91, -0.41), worse insomnia ($B = 4.86$, 95%CI: 3.98, 5.74) and worse sleep quality ($B = 1.44$, 95%CI: 0.76, 2.12), less self-reported sleep duration ($B = -35.17$, 95%CI: -62.36, -7.97), more snoring (oOR=2.49, 95%CI: 1.58, 3.93) and more depression ($B = 4.52$, 95%CI: 3.69, 5.35) and anxiety ($B = 3.54$, 95%CI: 2.86, 4.21).

Conclusion: These findings emphasize the need to consider cultural context in both the assessment and treatment of sleep disturbances and suggest that nightmares may serve as a critical index of acculturative stress and mental health risk among US-Mexico border residents.

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1051

ASSOCIATIONS BETWEEN TRAUMA-RELATED SLEEP DISTURBANCES, AUTONOMIC DIAGNOSES, AND PRAZOSIN PRESCRIPTION IN A SAMPLE OF VETERANS WITH POLYSOMNOGRAPHY

Mackenzie Lind¹, Ruth Assefa², Catherine McCall³, Rebecca Hendrickson⁴

¹VA Puget Sound Health Care System, Seattle Division,

²University of Washington School of Medicine, ³University of Washington, ⁴VA Puget Sound Health Care System

Introduction: Traumatic events are common and frequently followed by persistent sleep disruption, which can include repetitive nightmares, dream enactment behaviors, and nighttime autonomic dysregulation in addition to insomnia. These symptoms are included in the proposed diagnosis of trauma-associated sleep disorder (TASD), though overlap substantially with post-traumatic stress disorder (PTSD), rapid eye movement sleep behavior disorder (RBD) and obstructive sleep apnea (OSA). As autonomic disturbances may help differentiate TASD from related diagnoses, more research into autonomic dysfunction is warranted.

Methods: VA electronic medical record data for individuals who have undergone polysomnography ($N = 1,036,904$, 92% male, mean [SD] age 65.6 [13.8]) was used to examine relationships between autonomic disorders, preliminary TASD variable, and related diagnoses (i.e., OSA, RBD, and PTSD), as well as outpatient

prescriptions of prazosin and clonidine. ICD-10 codes were used to obtain sleep, psychiatric, and autonomic diagnoses, and the preliminary TASD variable was created using full text search of clinical note data for TASD-related terms.

Results: Autonomic diagnoses (i.e., orthostatic hypotension, fibromyalgia, chronic fatigue, postural orthostatic tachycardia syndrome, inappropriate sinus tachycardia, unspecified autonomic disorder; presented in aggregate for power) were more common across all TASD-related diagnoses and preliminary TASD variable: PTSD (10.5% vs. 6.0%; $p < 2.2e-16$); RBD (20% vs. 7.5%; $p < 2.2e-16$); OSA (8.9% vs. 4.7%; $p < 2.2e-16$); other parasomnias (14.7% vs. 7.5%; $p < 2.2e-16$), TASD (16.2% vs. 7.6%; $p = 2.2e-15$). Individual results for orthostatic hypotension and fibromyalgia were similar. Rates of prazosin prescription were highest for individuals with preliminary TASD diagnosis (67%), though also common in PTSD (43%) compared to RBD/other parasomnias and OSA (14-15% and 4% after removing individuals with PTSD). Clonidine was prescribed at lower rates (8-12%).

Conclusion: High rates of autonomic disorder comorbidity were seen across all diagnoses containing overlap with TASD symptoms, including OSA. A more detailed understanding of autonomic changes, particularly at night, is needed to identify potential patterns unique to TASD. High rates of prazosin prescription in TASD suggest this preliminary variable captures individuals with significant trauma-related sleep disturbances. Ongoing work is incorporating specific autonomic parameters, polysomnography data, and additional chart note data into TASD diagnosis.

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1052

COGNITIVE PRE-SLEEP AROUSAL AS A MEDIATOR OF INSOMNIA AND SEXUAL TRAUMA IN WOMEN

Anna Quesada, Elijah Nichols, Nancy Hamilton
University of Kansas

Introduction: Women are disproportionately affected by sexual trauma (ST) and commonly experience subsequent significant sleep difficulties, notably PTSD symptoms and severe insomnia. Cognitive pre-sleep arousal (i.e. thinking before bed, worrying, anxiety) contributes directly to insomnia symptoms. Addressing research gaps among women and ST, we investigated the role of cognitive arousal before sleep as a mediator of insomnia and ST history in women.

Methods: Women ($n=759$) recruited at the University of Kansas completed a battery of questionnaires including the Insomnia Severity Index (ISI), Cognitive Pre-Sleep Arousal Scale (PSAS-C), and ST history questions. A mediation analysis was conducted using Hayes PROCESS Model 4, controlling for age.

Results: Women with a sexual assault history reported higher pre-sleep cognitive arousal ($b = 0.46$, $SE = 0.10$, $p < .001$). Higher pre-sleep cognitive arousal was associated with more severe insomnia symptoms ($b = 0.02$, $SE = 0.001$, $p < .001$). Sexual assault history also demonstrated a significant direct effect on insomnia severity ($b = 0.009$, $SE = 0.004$, $p = .020$). The indirect effect through pre-sleep cognitive arousal was significant ($b = 0.01$, $BootSE = 0.003$, 95% CI [0.0058, 0.0172]), indicating evidence of mediation.

Conclusion: These results indicate cognitive arousal plays a role in the perpetuation of insomnia symptoms following ST. Though

this seems intuitive, there is importance of further understanding the mechanisms of how sexual violence affects the health of women, especially as sleep is determinant of physical and mental wellbeing.

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1053

EXPERIENTIAL AVOIDANCE IS ASSOCIATED WITH INSOMNIA SYMPTOMS AND RELATED CONSEQUENCES AMONG VETERANS WITH POSTTRAUMATIC STRESS DISORDER

Jennifer Tran¹, Zainab Al-Tameemi¹, Alaina Gold², Alexander Erickson³, Monica Kelly⁴, Michael Mitchell⁵, Sarah Kate McGowan², Chase MacCabe², Michelle Zeidler⁶, Constance Fung⁵, Cathy Alessi⁵, Elizabeth Yano⁶, Thomas Neylan⁷, Jennifer Martin⁸, Gwendolyn Carlson²

¹University of California Los Angeles, ²Department of Mental Health, Veterans Affairs (VA) Greater Los Angeles Healthcare System, ³National Sleep Foundation, ⁴David Geffen School of Medicine, University of California Los Angeles, ⁵Geriatric Research, Education and Clinical Center, VA Greater Los Angeles Healthcare System, ⁶Department of Medicine, David Geffen School of Medicine, University of California Los Angeles, ⁷Department of Psychiatry and Neurology, University of California San Francisco, ⁸VA Miami Healthcare System, Geriatric Research, Education and Clinical Center

Introduction: Insomnia disorder frequently co-occurs with post-traumatic stress disorder (PTSD), and sleep disturbances may precede and worsen PTSD symptoms. Traumatic events can precipitate insomnia symptoms, yet the mechanisms linking trauma to sleep disruption remain unclear. Daytime experiential avoidance, a core feature of PTSD, may contribute to sleep disturbance through heightened cognitive and emotional arousal. Experiential avoidance reflects an unwillingness to experience distressing internal events such as emotions, memories, or sensations. We examined whether experiential avoidance was predictive of insomnia, sleep quality, and daytime sleepiness in veterans with PTSD.

Methods: We analyzed baseline assessment data from 93 veterans as part of an ongoing clinical comparative effectiveness trial testing insomnia behavioral interventions (NCT05194930). All veterans met DSM-5 criteria for PTSD based on the Clinician-Administered PTSD Scale for DSM-5 and attributed their insomnia symptoms to a traumatic event. The baseline assessment included the Brief Experiential Avoidance Questionnaire (BEAQ), Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and insomnia-related daytime consequence items corresponding to the International Classification of Sleep Disorders (ICSD-3-TR). Multiple linear regressions examined associations between BEAQ and each sleep outcome, controlling for age and sex.

Results: The mean age was 54.7 years, 86.0% were male, and 591% were white. Greater BEAQ score significantly predicted greater ISI ($p = 0.002$), ESS ($p = 0.020$), and ICSD daytime consequences ($p = 0.031$). Greater BEAQ scores did not predict PSQI sleep efficiency ($p = 0.454$) or PSQI perceived sleep quality ($p = 0.266$) factors, but did predict greater PSQI daily disturbances factor ($p = 0.004$).

Conclusion: Experiential avoidance was positively associated with insomnia severity, daily disturbances, daytime sleepiness, and insomnia-related daytime consequences among veterans

with PTSD. However, these associations may be bidirectional. Behavioral insomnia treatment may be enhanced by integrating interventions that target experiential avoidance such as acceptance and commitment therapy (ACT). By intervening on both nocturnal symptoms and daytime functioning, ACT may represent an important, yet underutilized, treatment pathway in trauma-related insomnia care.

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1054

FACTORS ASSOCIATED WITH SLEEP DISTURBANCES AND FATIGUE AMONG TAIWANESE PRIMARY FAMILY CAREGIVERS IN INTENSIVE CARE UNITS

Pei-Yu Chang¹, Shao-Yu Tsai²

¹Taichung Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, ²National Taiwan University

Introduction: Primary family caregivers (PFCs) of patients in intensive care units (ICUs) frequently experience high levels of stress, which may contribute to sleep disturbances and fatigue. Identifying factors associated with these symptoms is critical for informing targeted interventions. This study examined factors associated with sleep disturbances and fatigue among PFCs in ICUs.

Methods: Data were derived from baseline assessments of an ongoing pilot experimental study conducted in four adult ICUs at a teaching hospital in central Taiwan. Eligible participants were unpaid PFCs of patients receiving mechanical ventilation for more than 48 hours. Participants completed validated questionnaires assessing perceived stress (Impact of Event Scale-Revised, IES-R), sleep disturbance (General Sleep Disturbance Scale, GSDS), fatigue (7-item Lee Fatigue Scale, LFS), coping strategies (Brief COPE), and perceived social support (Multidimensional Scale of Perceived Social Support). Pearson correlations and multivariable linear regression analyses were conducted to examine factors associated with sleep disturbances and fatigue.

Results: Eighty PFCs were recruited, with a mean age of 52.1±12.2 years and 55 (68.8%) participants were female. Participants reported elevated scores for perceived stress (IES-R: 36.2 ± 17.7), sleep disturbance (GSDS: 3.48 ± 1.35), and fatigue (LFS: 3.77 ± 2.01). Higher stress levels were correlated with greater use of both adaptive and maladaptive coping strategies ($r = 0.58$, $p < 0.05$). In multivariable regression analyses, self-rated patient disease severity and perceived stress were the significant predictors of sleep disturbances and fatigue (both $p < 0.05$). The full models, including sex, age, self-rated patient disease severity, perceived social support, perceived stress, and overall coping, explained 47.4% of the variance in sleep disturbance [$F(6,73) = 12.86$, $p < 0.05$] and 38.7% of the variance in fatigue [$F(6,73) = 9.32$, $p < 0.05$].

Conclusion: Primary family caregivers of ICU patients experience substantial stress, sleep disturbance, and fatigue. Perceived stress and caregivers' appraisal of patient disease severity were key factors associated with both outcomes. These findings suggest that interventions aimed at improving stress management and enhancing caregivers' understanding and coping with the

patient's condition may help alleviate stress-related sleep disturbance and fatigue in ICU caregivers.

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1055

HIGH PREVALENCE OF SYMPTOMS OF REM SLEEP BEHAVIOR DISORDER IN POST-TRAUMATIC STRESS DISORDER FOLLOWING SINGLE TRAUMA: A CROSS-SECTIONAL STUDY

Rivaud Céline, Julie Geneste, Isabelle Rieu, Philippe Marc, Delphine Robillard, Alisson Rosec, Bruno Pereira, Maria Livia Fantini
CHU Clermont-Ferrand

Introduction: Sleep disturbances are highly prevalent in Post-Traumatic Stress Disorder (PTSD), with violent nightmares affecting 50–90% of patients. Rapid Eye Movement Sleep Behavior Disorder (RBD), affecting 0.5–4.8% of the general population, may reach 15% prevalence in veterans with PTSD mostly related to repeated or prolonged exposure to traumatic event (type 2 trauma). This study aimed to assess the prevalence of probable RBD (pRBD) and its relationship with PTSD symptom severity in patients with PTSD following a sudden and single traumatic event (type 1 trauma).

Methods: In this single-center, cross-sectional study, French-speaking adults aged 18–50 years with DSM-5 PTSD after type 1 trauma were recruited from the Emergency Medical and Psychological Unit (CUMP) at Clermont-Ferrand University Hospital. Participants completed the Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5), the REM Sleep Behavior Disorder Screening Questionnaire (RBDSQ), the International RBD Symptom Severity Scale (IRBD-SSS), and the Pittsburgh Sleep Quality Index (PSQI).

Results: Forty-one patients (17 men; mean age 36.27±10.39) were included. The prevalence of pRBD (RBDSQ ≥ 5) was 73.17%. PTSD severity correlated with RBD symptom severity ($r = 0.529$, $p = 0.003$), especially nightmares ($r = 0.605$, $p < 0.0001$). In the pRBD+ group, RBD severity correlated with unwanted upsetting memories ($r = 0.507$), traumatic dreams ($r = 0.465$), anhedonia ($r = 0.499$), social withdrawal ($r = 0.453$), irritability ($r = 0.404$), concentration difficulties ($r = 0.587$), and sleep disturbances ($r = 0.587$).

Conclusion: Probable RBD is highly prevalent in PTSD related to a single traumatic event. Its association with PTSD symptom severity supports shared neurobiological pathways and underlines the need for systematic sleep assessment in PTSD management.

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1056

TARGETED DREAM INCUBATION'S IMPACT ON DREAM SELF-EFFICACY, NIGHTMARES, SUICIDE, PTSD, AND INSOMNIA

Westley Youngren¹, Victoria West Staples¹, Emma Angle¹, Adam Horowitz², Michelle Carr³, Karen Konkoly², Guillermo Bernal⁴, Robert Stickgold⁵

¹University of Missouri, Kansas City, ²DUST, ³University of Montreal, ⁴FASCIA.AI, ⁵Harvard Medical School

Introduction: Targeted Dream Incubation (TDI) is the process of giving an individual auditory cues (i.e., "think of a tree") while they are falling asleep, with the goal of shaping dream content (into

something such as a tree). Recent research has demonstrated TDI may be able to increase dream self-efficacy (DSE) and influence other mental health outcomes. Thus, our study explored how TDI impacted DSE, nightmare distress, PTSD, insomnia, and thoughts of suicide in a non-clinical sample and a sample that experiences frequent trauma-related nightmares (TRNs).

Methods: Our study included $N = 30$ participants; $n = 20$ received one 90-minute session of TDI and $n = 10$ received one 90-minute nap instead of TDI. Within the TDI condition there were two groups, one group that experienced TRNs ($n = 10$) and one group that did not ($n = 10$). All participants completed surveys immediately prior to TDI or nap (baseline), immediately after TDI or nap (post), and one-week after completing TDI or nap (follow-up). ANOVAs were used to analyze the differences in DSE among our groups. Paired sample t-tests were used to examine changes in our outcome variables between baseline, post, and follow-up.

Results: At baseline, there were no significant differences in DSE among any groups ($p > .05$). The control group saw no changes in DSE across any timepoints, but both TDI groups saw significant ($p < .05$) increases in DSE immediately after TDI ($t = -1.85$) and at one-week follow-up ($t = -3.60$). Regarding outcomes, only the TDI-NM group had any significant changes. Specifically, at the follow-up they had significant ($p < .05$) reductions in thoughts of suicide ($t = 2.11$), insomnia ($t = 1.93$), PTSD ($t = 2.92$), and nightmare distress ($t = 3.88$).

Conclusion: Our results support previous research, by demonstrating that TDI can increase DSE. Furthermore, our results suggest that TDI may be able to significantly reduce several negative outcomes variables within individuals experiencing trauma related nightmares, potentially through the intervening variable of DSE. These results justify a further large-scale investigation into the relationship between TDI, DSE, and negative outcomes in a sample that experiences TRNs.

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1057

TRAUMA-RELATED SLEEP PROCESSES AND MENTAL HEALTH: THE ROLES OF DREAM SELF-EFFICACY AND NIGHTMARE DISTRESS

Victoria West Staples¹, Westley Youngren¹, Emma Angle¹, Adam Horowitz², Michelle Carr³, Karen Konkoly², Guillermo Bernal⁴, Robert Stickgold⁵

¹University of Missouri, Kansas City, ²DUST, ³University of Montreal, ⁴FASCI.A.I., ⁵Harvard Medical School

Introduction: Both heightened nightmare (NM) distress, intense negative emotional reactions to nightmares, and low dream self-efficacy (DSE; the perceived ability to manage or influence dream experiences), are understudied contributors to posttraumatic functioning. Individuals with lower DSE shows increased suicide risk in trauma survivors and may increase emotional disturbances during sleep, while NM distress is strongly linked to daytime impairment and suicide risk. Despite these associations, the unique and combined contributions of DSE and NM distress to PTSD symptoms, insomnia, and suicidal thoughts remain unclear. This study examined whether DSE and NM distress independently predicted these clinically relevant outcomes in a trauma-exposed sample.

Methods: As part of a larger study on Targeted Dream Incubation (TDI), which involves providing auditory cues (e.g., “think of a

tree”) as individuals fall asleep to shape dream content, $N = 30$ completed an in-person survey battery. Surveys assessing DSE, NM distress, PTSD symptoms, insomnia, and suicidal thoughts were completed at baseline (pre-TDI/nap). For the present study, three multiple linear regressions were conducted to evaluate whether DSE and NM distress significantly predicted PTSD symptoms, insomnia severity, and suicidal thoughts.

Results: Both DSE ($b = .41$) and NM distress ($b = 1.83$) were significant predictors of PTSD symptoms ($p < .001$). For insomnia, DSE emerged as the only significant predictor ($b = .18$, $p < .05$). For thoughts related to suicide, both DSE ($b = .31$) and NM distress ($b = 1.48$) were significant predictors ($p < .05$).

Conclusion: Findings indicate that trauma-related dreaming, specifically lower DSE and heightened NM distress, are associated with PTSD symptom severity, suggesting that both confidence in managing dreams and the distress experienced from nightmares independently contribute to posttraumatic outcomes. Reduced DSE alone predicted insomnia severity, highlighting that confidence in dream management may influence broader sleep disturbances beyond nightmare distress. For suicidal thoughts, both lower DSE and higher NM distress were significant predictors, emphasizing the relevance of trauma-related dream variables to suicide risk. These results highlight the importance of assessing DSE and NM distress in trauma-exposed individuals; however, future research should extend these findings to inform clinical utility.

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1058

TRIPLE DUTY: PREGABALIN FOR CHRONIC HEADACHE, INSOMNIA, AND NIGHTMARES: A CASE SERIES

Sophia Rosin¹, Tobin Joshua², James Bates³

¹University of Michigan, ²Banner Health, ³University of Arizona College of Medicine

Introduction: Objective: To evaluate the effects of pregabalin on nightmare frequency, sleep quality, and headache frequency, severity, duration, and disability in patients with chronic headache, insomnia, and nightmares. Background: Headaches, insomnia, and nightmares frequently co-occur and contribute to substantial disability. While pregabalin has established roles in treating neuropathic pain, headaches, and anxiety, its potential benefit in reducing nightmares has not been systematically studied.

Methods: A retrospective case series was conducted, including 24 patients prescribed pregabalin for headache, insomnia, and nightmares. Clinical data were extracted from the medical record, including headache characteristics, sleep quality, nightmare frequency, and MIDAS scores. Within-subject pre-post comparisons were performed using paired t-tests or Wilcoxon signed-rank tests, depending on distribution.

Results: Pregabalin was associated with significant improvements across multiple domains. Nightmare frequency decreased by 81% (from 17.5 to 3.3 episodes/month, $p = 0.001$, large effect), and refreshing sleep nights increased by 127% (from 1.8 to 4.0 nights/week, $p = 0.001$). Headache frequency was reduced by 50% (from 17.0 to 8.5 per month, $p = 0.010$). Headache severity and duration decreased, but changes were not statistically significant,

likely due to smaller sample sizes for these measures. Migraine-related disability scores decreased by 35% (from MIDAS 44 to 24.5, $p = 0.020$). Of seven patients with documented nightmare frequency who transitioned from gabapentin to pregabalin, six (85.7%) experienced substantial reductions, suggesting improved efficacy despite pharmacologic similarities.

Conclusion: Pregabalin demonstrated robust improvements in nightmare frequency, sleep quality, headache frequency, and migraine-related disability. The marked reduction in nightmares is a particularly novel finding, as pregabalin has not been previously established as a treatment for nightmares. These results suggest that pregabalin may offer a unique therapeutic option for patients with chronic headache, insomnia, and nightmares. Larger controlled studies are needed to confirm these findings and further elucidate underlying mechanisms.

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1059

THE HIDDEN TOLL OF CARE: LONELINESS AND BAD DREAMS IN GRANDPARENT CAREGIVERS

Melanie Stearns¹, Brielle Distler¹, Samantha Greenfield¹, Christina McCrae¹, Michael Nadorff²

¹University of South Florida, ²Mississippi State University

Introduction: Evidence indicates a strong relationship between increased stress, loneliness, and worse sleep (bad dreams). Scant research has examined these relationships in grandparents caring for their grandchildren, although they report increased stress and loneliness and worse sleep than non-caregiving grandparents. Moreover, no research has examined bad dreams in grandparent caregivers or the relationship loneliness may have with stress and bad dreams in this population. We explored whether caregiving grandparents are more susceptible to experiencing bad dreams and heightened loneliness and if loneliness helps to explain the relationship between caregiving status and bad dreams.

Methods: Sample included individuals in the second wave of the 2009 MIDUS biomarkers project who answered the variables of interest and reported being responsible for the care of their grandchildren for at least 1 year ($N=62$, age $M=61.80$, 64% female) or non-caregiving grandparents ($N=424$, age $M=62.98$, 56.2% female). A t-test examined whether caregiving status (Y/N) was related to bad dream frequency (1-4) and loneliness frequency (1-5). Bootstrapping (SPSS PROCESS) examined whether loneliness mediated the relationship between caregiving status and bad dreams. Analyses controlled for age and gender.

Results: Grandparent caregivers ($M=1.58$, $SD=.88$) were more likely to have bad dreams compared to non-caregiving grandparents ($M=1.36$, $SD=.71$; $t(484)=7.58$, $p=.029$). Grandparent caregivers also reported more loneliness ($M=1.81$, $SD=.91$) than non-caregiving grandparents ($M=1.38$, $SD=.69$; $t(484)=15.01$, $p<.001$). Loneliness mediated ($\beta=.05$) the relation between caregiving status and bad dreams. Caregiving status was associated with greater loneliness ($r=.20$, $p=.01$) and greater loneliness was associated with increased bad dreams ($r=.12$, $p=.01$). Although caregiving status was associated with more bad dreams ($r=.10$, $p=.03$), the mediation direct effect between caregiving status and bad dreams was not significant.

Conclusion: These results suggest that loneliness may be a key psychosocial mechanism linking caregiving burden to bad dreams. Future research should expand on these findings by

examining longitudinal trajectories of caregiving stress, loneliness, and bad dreams, as well as exploring potential moderating factors such as sex differences, caregiving intensity, and social support networks. Additionally, intervention studies targeting loneliness (e.g., community-based programs, peer support, or digital platforms) may help mitigate the psychosocial burden and improve sleep health in this population.

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1060

INVESTIGATING MECHANISMS IN THE SLEEP-ALCOHOL RELATIONSHIP: AN ECOLOGICAL MOMENTARY ASSESSMENT APPROACH

Emma Tussey, Maria Wong
Idaho State University

Introduction: Research has established sleep disturbance as a risk factor for alcohol misuse. Nevertheless, we do not understand the mechanisms for the sleep-alcohol relationship. We hypothesized that higher negative mood and lower positive mood were mechanisms for the relationship between sleep disturbance and alcohol misuse.

Methods: 64 participants (60.9 % female, mean age 22) completed daily diaries about their sleep and alcohol use, wore an Acti-watch, and responded to ecological momentary assessments of their mood for 14 days. Multi-level zero-inflated Poisson models tested whether negative and positive moods mediated the relationship between prior-night sleep disturbance and next-day alcohol use, including the likelihood of abstaining from alcohol and drinking quantity amongst individuals who do drink. Models assessed both within-subject (daily) and between-subject (average) effects because daily variations in sleep could predict alcohol use independently from average patterns. Race, age, sex (0=male; 1=female), and day type (0=weekday or 1=weekend) were controlled in the analyses.

Results: Shorter average total sleep time ($IR=0.996$, $p < .05$) and lower average sleep efficiency ($IR=0.968$, $p < .05$) predicted increased daily drinking quantity. Conversely, lower daily sleep efficiency predicted decreased daily drinking quantity ($IR=1.020$, $p < .05$). Lower sleep quality predicted greater negative mood on both the daily ($B=-0.093$, $p < .05$) and average level ($B=-0.195$, $p < .05$), but negative mood did not mediate the sleep-alcohol use relationship (daily 95% CI [-0.021, 0.009]; average 95% CI [-0.028, 0.184]). Daily positive mood mediated the relationship between daily sleep quality and daily alcohol abstinence (95% CI [-0.084, -0.009]). Lower daily sleep quality predicted lower daily positive mood ($B = 0.106$, $p < .05$), and lower daily positive mood predicted greater likelihood of abstaining from alcohol use ($OR=0.95$, $p < .05$).

Conclusion: Sleep disruption predicted alcohol use differently depending on whether it was acute or chronic. Negative mood did not mediate the sleep-alcohol relationship, and positive mood mediated the relationship in an unexpected way; lower daily sleep quality predicted lower daily positive mood, which predicted greater likelihood of abstaining from drinking. Overall, findings suggest that the sleep-alcohol use relationship is nuanced, varying with both positive mood and timescale.

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1061

TOWARD BEHAVIORAL HEALTH RISK MONITORING VIA WEARABLE PHYSIOLOGICAL SENSING DURING SLEEP

Sophia Yuditskaya¹, Jing Wang¹, Alec Carruthers¹, Rachel Markwald², Alice LaGoy², Jason Jameson³, Andrew Kubala³, Molly Crane¹, Jacqueline Scott¹

¹Human Health and Performance Systems, MIT Lincoln Laboratory, ²Sleep, Tactical Efficiency, and Endurance Laboratory, Warfighter Performance Department, Naval Health Research Center, ³Sleep, Tactical Efficiency, and Endurance Laboratory, Warfighter Performance Department, Naval Health Research Center; Health Solutions, Leidos, Inc.

Introduction: In shipboard military operations, where chronic stress, irregular schedules, and sleep disruption are pervasive, personnel can experience a greater risk of behavioral health disturbances. Wearable sensors may facilitate monitoring of sleep and associated behavioral health symptoms with minimal disruption to operational demands. As a foundational step towards such a solution, we investigated the degree to which wearable-derived sleep outcomes can serve as indicators of changes in depression and anxiety symptoms.

Methods: Shipboard U.S. Navy personnel (113 men, 83 women) wore Oura Ring (Generation 2 and 3) for 8-26 weeks and completed periodic behavioral health surveys (separated by 20 days) that assessed depression using either the PROMIS or PHQ-8, or anxiety using GAD-7. Physiological markers were computed per sleep period according to Oura algorithms: average heart rate variability (HRV), and calculated sleep summary outcomes [total sleep time (TST), total wake time (TWT), sleep efficiency (SE), sleep latency, and sleep staging durations for light, deep, and REM)]. Linear mixed-effects regression examined associations between these repeated measures across up to two weeks of sleep data prior to reported behavioral health symptoms. The mediating impact of age, BMI, sex, and psychiatric medication intake was also explored. Separate models were fit for each outcome: depression score (DEP), depression severity change (Δ DEP), anxiety score (ANX), and anxiety severity change (Δ ANX). Exhaustive best-subset selection minimizing AIC provided inference on indicator associations. Pearson correlation between estimated and actual outcome values characterized fit quality.

Results: Best-fit models showed robust fit quality with significance: DEP: 0.87 (N=77), Δ DEP: 0.62 (N=70), ANX: 0.87 (N=27), Δ ANX: 0.64 (N=27). While sleep latency was associated with both depression outcomes (DEP, $p=0.019$; Δ DEP, $p=0.033$), TWT showed the strongest relationship with DEP ($p=0.01$), whereas SE was the primary correlate for Δ DEP ($p=0.004$). For anxiety outcomes, REM duration was the top predictor (ANX, $p<0.001$; Δ ANX, $p=0.027$). Two mediating factors showed limited effects as adjustment covariates: Age (DEP) and BMI (Δ DEP).

Conclusion: Robust associations of wearable-derived sleep metrics with behavioral health outcomes substantiate the potential of using them as indicators of worsening or improving depression and/or anxiety symptoms.

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1062

EEG-DERIVED BIOMARKERS PREDICT SLEEP PERCEPTION IMPAIRMENT IN MAJOR DEPRESSION

Jiong Chen¹, Hongjuan Li², Meng Qi², Leilei Wang², Shuangjiang Zhou², Jingxu Chen², Song Gao¹, Shuping Tan², Yue Leng³

¹Peking University Health Science Center, ²Sleep Medicine Center, Beijing HuiLongGuan Hospital, ³University of California, San Francisco

Introduction: Sleep perception impairment (SPI) in depression refers to a marked discrepancy between subjective and objective sleep, similar to paradoxical insomnia. Many depressed patients report poor sleep despite normal polysomnography (PSG), yet the neurophysiological basis of this misperception remains unclear. We examined whether EEG microarchitecture features differentiate depressed patients with SPI from those without SPI.

Methods: We included 63 adults with major depressive disorder and insomnia symptoms who underwent overnight PSG. SPI was defined as underestimating sleep by ≥ 60 minutes compared with PSG-derived total sleep time. Based on this criterion, 26 participants were classified as SPI and 37 as non-SPI. Continuous EEG measures were extracted, including total spectral power (0.5–40 Hz, μV^2), an interhemispheric symmetry index (ratio of NREM spindle-band power between hemispheres), and high-frequency spectral ratios (e.g., beta/delta, gamma/delta). Group differences were examined, and multivariable logistic regression evaluated EEG predictors of SPI. Linear regression assessed associations with the magnitude of subjective-objective sleep discrepancy.

Results: Objective sleep duration was comparable between groups (~ 7 hours), yet SPI participants perceived significantly shorter sleep. SPI patients showed lower total EEG power ($9730 \pm 2767 \mu V^2$ vs $12482 \pm 4179 \mu V^2$, $p=0.003$) and reduced EEG symmetry (0.50 vs 0.51 , $p=0.02$). High-frequency activity was elevated in SPI: the N2 beta/delta ratio was higher in SPI (0.34 vs 0.26 , $p=0.02$), with similar increases in gamma/delta ratio ($p=0.01$). In adjusted logistic models, higher total EEG power predicted lower SPI likelihood (OR ≈ 0.35 per $1000 \mu V^2$, $p<0.05$). A 0.01 increase in symmetry index was similarly protective (OR ≈ 0.47 , $p<0.05$). Higher beta/delta ratio was associated with greater SPI odds (approximately two-fold per 0.1 increment). Linear regression showed that greater EEG power related to a smaller subjective-objective sleep gap ($\beta = -34$ min, $p=0.04$).

Conclusion: Depressed patients with SPI demonstrate distinct EEG microarchitecture marked by reduced slow-wave amplitude, elevated fast-frequency activity, and subtle interhemispheric asymmetry. This objectively “lighter” sleep pattern supports a cortical hyperarousal mechanism underlying sleep misperception. Continuous EEG features—particularly total power, symmetry, and spectral ratios—may serve as promising biomarkers to identify SPI and inform targeted interventions.

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1063

HYPER-SYNCHRONIZATION OF SLOW WAVES DURING NREM SLEEP IN MAJOR DEPRESSIVE DISORDERSantiago Lopez Pereyra¹, Jennifer Goldschmied²¹Facultad de Matemáticas, Astronomía, Física y Computación,²University of Pennsylvania

Introduction: Major depressive disorder (MDD) has been posited to be characterized by a state of hyper-synchronization or "network rigidity" during wakefulness. During sleep, cortical synchronization is the hallmark of slow-wave activity, and while multiple studies have shown that MDD is characterized by reduced slow-wave activity during sleep, little is known about the spatio-temporal synchronization of sleep slow-waves in healthy individuals and those with MDD. In particular, it remains unclear whether the hyper-synchronized state observed during wakefulness in MDD persists into sleep. Therefore, the objective of this study was to assess whether sleep slow-waves showed altered synchronization patterns in individuals with MDD.

Methods: To characterize macro-scale intra- and inter-hemispheric connectivity, EEG (F3/4, C3/4, O1/2) was recorded in individuals with MDD (N=30) and healthy (N=17) subjects during a baseline night of sleep. For each pair of electrodes, we estimated phase-lagged synchronization in the Delta band (0.4-3.9Hz) during the first NREM period using the Weighted Phase Lag Index (wPLI). The wPLI proxies brain connectivity by capturing the lagged coupling of EEG signals while mitigating artifacts associated with volume conduction. We computed the average wPLI value, or node strength, of each electrode. We performed cluster-based permutation testing to determine if there were significant differences in node strength between those with MDD and healthy controls. This approach corrects for the multiple comparisons problem by clustering spatially adjacent electrodes that exhibit significant effects (cluster-forming threshold $p < 0.05$).

Results: Our analysis revealed a significant cluster of electrodes (O1/2) exhibiting higher node strength in depressed individuals relative to controls (p -value = 0.0293), indicating hyper-synchronization of delta-band activity during NREM sleep.

Conclusion: These results indicate that the "network rigidity" characteristic of MDD during wakefulness persists into NREM sleep, particularly in occipital regions of the brain. This suggests that MDD may involve not only alterations in slow-wave activity, but also alterations in the spatio-temporal synchronization of sleep slow-waves. Although the functional consequences of this hyper-synchronization remain unclear, future work should examine possible implications for the restorative function of slow-wave activity in MDD.

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1064

STRESS AND VIOLENCE EXPOSURE PREDICT POOR SLEEP QUALITY IN SEXUAL AND GENDER MINORITIESMairead Moloney¹, Jessica Weafer², Gabe Miller³, Michelle Thompson⁴¹University of Miami Miller School of Medicine, ²The Ohio State University, ³The University of Alabama at Birmingham, ⁴Lehigh University

Introduction: Nearly one-third of U.S. adults experience poor sleep quality. Sleep health is critical for health and well-being, however sleep among sexual and gender minorities (SGM), is understudied. Given the disproportionate prevalence of psychosocial stressors and violence resulting from discrimination in this population, and documented linkages between stress and sleep, we ask: What are the associations between perceived stress, exposure to violence, and sleep quality among SGM living in the U.S.?

Methods: We analyzed cross-sectional data for self-identified SGM individuals (N=204), aged 21 to 82, who completed an online Qualtrics survey about LGBTQ+ experiences and health. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), perceived stress via the Perceived Stress Scale, and violence exposure with a version of the PRIDE Lifetime Health and Experiences Survey. Sociodemographic data included gender identity, age, education, race and/or ethnicity. Unadjusted and adjusted multivariable linear regression models identified independent associations of perceived stress and violence exposure with sleep quality, adjusting for relevant sociodemographic covariates.

Results: All participants identified as sexual minorities (Mage 32.9, SD = 9.2); most were female (71.1%). Two-thirds (75.5%) reported a college or graduate/professional degree or greater. 63.7% identified as White; 12.3% Middle Eastern/North African, 2.5% American Indian/Alaskan Native, 9.3% two or more races, 4.9% Black/African American, and 7.4% Hispanic or Latino. Nearly all participants (males = 89.1%; females = 92%) scored >6 on the PSQI, indicating poor sleep quality. Participants reported an average of 3.3 (SD = 3.8) violence exposures in the preceding year. In fully adjusted models, greater perceived stress ($\beta = 2.36$, $p < 0.001$) and greater violence exposure ($\beta = 0.14$, $p = 0.022$) were associated with worse sleep quality ($\beta = 6.56$, $p < 0.001$). Sensitivity analyses confirmed the robustness of these findings.

Conclusion: In our sample, SGM experience exceptionally high rates of poor sleep quality (>89%), independently associated with perceived stress and violence exposure. These findings underscore the need for comprehensive interventions addressing minority stress and violence prevention at individual, healthcare, and policy levels. Improving SGM sleep health requires trauma-informed approaches that address the unique psychosocial stressors faced by this vulnerable community.

Support (if any): NA

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1065

WHEN THE BODY SETTLES, PAIN SETTLES: ANXIETY SHAPES HOW NIGHT-TIME MOVEMENT PREDICTS PAIN RELIEFBritani Holland¹, Emma Rose Stevenson¹, Jacob Williams², Daniela Roditi³, Jennifer Mundt⁴, Mary Beth Miller⁵, Ashley Curtis⁶, Lori Waxenberg⁷, Roland Staud⁷, Richard Berry⁷, Michael Robinson⁷, Christina McCrae¹¹University of South Florida, ²TIRR Memorial Hermann Hospital,³Genentech, ⁴University of Utah, ⁵University of Missouri, ⁶Sleep & Health Innovations in Neurobehavioral (SHINE) Science Center, College of Nursing, University of South Florida, ⁷University of Florida

Introduction: Greater objective sleep disturbances amplify subjective pain intensity and unpleasantness through pathways influenced by current and long-term anxiety. Elevated anxiety can diminish therapeutic response to cognitive behavioral interventions for insomnia (CBT-I) and pain (CBT-P), reducing treatment

efficacy. This secondary data analysis assesses whether baseline anxiety functions as a moderator of changes in the sleep-pain relationship following CBT-I and CBT-P interventions.

Methods: Participants were drawn from an NIH-funded RCT (R01AR055160; NCT02001077; McCrae PI) evaluating CBT-I and CBT-P on patients with fibromyalgia and insomnia. The moderation analyses (SPSS) included randomized participants ($N = 50$; $\bar{x}$ age = 52.87; 96.05% female). Total Sleep Time (TST), Total Wake Time (TWT) were measured using the Actiwatch 2 (Phillips Respironics, Bend, OR), baseline anxiety via the State-Trait Anxiety Inventory (STAI Y1), and daily pain intensity and unpleasantness from 14-day diary averages.

Results: Significant main effects emerged for changes in TST (TSTch) predicting changes in pain intensity (Pich) ($b = .60$, $p = .004$) and pain unpleasantness (PUch) ($b = .64$, $p = .002$) from baseline to post-treatment. STAI showed no main effects on either changes in Pich or PUch, but moderated both relationships. For Pich ($b = -.01$, $p = .006$), TSTch effects were significant at low ($b = .26$, $p = .004$) and average ($b = .13$, $p = .010$) levels of STAI. For PUch ($b = -.01$, $p = .002$), TSTch effects were significant at low ($b = .25$, $p = .004$) and average ($b = .11$, $p = .023$) levels of STAI. Models using TWT and those examining change through follow-up were nonsignificant.

Conclusion: Improvements in objectively assessed TST, but not TWT, immediately following the sleep and pain interventions were associated with lower pain only among individuals with low to moderate anxiety at post-treatment. Improving sleep alone may be insufficient for individuals with elevated anxiety, as anxiety can sustain activation in stress and central pain pathways, driving increased nighttime limb movements and reinforcing central sensitization, a state of increased CNS responsiveness that further intensifies pain. Therefore, addressing anxiety concurrently may be necessary to decrease sleep-impairing limb movements and achieve meaningful pain reductions.

Support (if any): NIAMS

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A PILOT RANDOMIZED CONTROLLED TRIAL OF DIGITAL COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IN OLDER ADULTS WITH SUICIDAL IDEATION

Andrew Tubbs¹, Jordan Karp², Fabian-Xosé Fernandez³, Michael Perlis⁴, Michael Grandner³

¹Washington University in St. Louis, ²University of Arizona College of Medicine, Tucson, ³University of Arizona, ⁴University of Pennsylvania

Introduction: Insomnia is more common among older adults and may increase risk for suicide in this population. Treating insomnia may reduce suicide risk. Cognitive behavioral therapy for insomnia is the first-line recommended therapy for insomnia and is available in a digital format (dCBT-I). This study piloted dCBT-I in older adults with both insomnia and suicidal ideation. Main outcomes included feasibility, tolerability, and intervention effect.

Methods: Older adults with suicidal ideation recruited from outpatient clinic referrals and internet advertising were randomized to either dCBT-I treatment (TX, $N=13$) or to waitlist control with crossover treatment (WLC, $N=11$). Treatment was provided through Sleep Health Using the Internet (SHUTi). Outcomes

included the Columbia Suicide Severity Rating Scale (CSSRS), the Insomnia Severity Index (ISI), and the Center for Epidemiologic Studies Depression Scale (CESD) and treatment effects were estimated using linear mixed effects regression models. Tolerability was assessed using a self-report questionnaire.

Results: Mean participant age was 69.1 years and did not differ between groups ($p=0.26$). Out of $N=19$ participants that completed baseline measures (11 TX, 8 WLC), $N=12$ (6 TX, 54.5%; 6 WLC, 75%) completed dCBT-I or monitoring. All $N=6$ WLC participants crossed over to dCBT-I and completed treatment, and $N=1$ TX participant dropped out after dCBT-I, leaving $N=11$ total dCBT-I completers. The most common side effects were sleepiness ($N=8/11$), anxiety ($N=7/11$), feeling tired ($N=7/11$), depression ($N=6/11$), and apathy ($N=6/11$). Two participants (8.3%) discontinued due to worsening mental health. No falls, suicide attempts, or preparatory acts for suicide were reported. Baseline insomnia severity averaged 14.7 (range 6-26), depression severity averaged 25.9 (range 7-49), and suicidal ideation averaged 2.18 (range 0-5); there were no group differences at baseline. Regression models showed significant decreases in suicidal ideation (-1.1 , $p=0.048$), insomnia (-5.6 , $p=0.02$), and depression (-9.4 , $p=0.043$) across groups, and a trend toward a group difference in insomnia severity before crossover (-5.9 , $p=0.087$).

Conclusion: Older adults with suicidal ideation tolerated dCBT-I without severe adverse effects, although dropout was high. Future work to reduce attrition and increase engagement with dCBT-I may increase access to insomnia treatment in this population.

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1067

PERSONAL LIGHT EXPOSURE IS ASSOCIATED WITH CIRCADIAN PHASE AND SLEEP TIMING IN YOUNG ADULTS WITH OCD AND DELAYED BEDTIMES

Kaitlyn Butler¹, Alyssa Week¹, Kenneth Wright², Rebecca Cox¹

¹Washington University in St. Louis, ²University of Colorado

Introduction: Prior literature implicates delayed circadian rhythms in obsessive-compulsive disorder (OCD), and later indicators of circadian rhythms are associated with more severe OCD symptoms. However, factors that contribute to delayed circadian rhythms in OCD remain unexplored. As light is the primary entrainment cue for the central circadian clock, and unhealthy light exposure patterns delay circadian rhythms, we examined associations between personal light exposure and circadian phase and sleep timing in individuals with OCD and delayed bedtimes.

Methods: Young adults with OCD and a bedtime of 01:00 or later ($N = 35$; 30 female, mean age = 22.18 ± 4.12) monitored personal light exposure and sleep for 2 weeks via wrist actigraphy (Actiwatch Spectrum, Phillips Respironics) and completed a 10-hour in-laboratory salivary dim light melatonin onset (DLMO) assessment. The following light exposure variables were calculated using the LightLogR package: time above threshold (TAT) 250, 500, and 1000 photopic lux; mean timing of light exposure (MLiT) above 250, 500, and 1000 lux; first and last timing of light exposure (FLiT; LLiT) above 50 lux and their within-subject standard deviation (FLiSD; LLiSD 50 lux SD). DLMO was defined as the linear interpolated point in time at which melatonin levels rose 2 SD above the mean of 3 baseline values. Midsleep was measured

by actigraphy. We used linear regression models covarying for solar photoperiod to examine associations between personal light exposure, DLMO, and midsleep. All p-values were FDR-corrected.

Results: Lower TAT 250, 500, and 1000 lux, later MLiT 250, 500, and 1000 lux, later FLiT 50 lux, and higher FLiT 50 lux SD were associated with later midsleep ($p < 0.05$). Later MLiT 250, 500, and 1000 lux and FLiT 50 lux were associated with later DLMO ($p < 0.05$).

Conclusion: Lower, later, and irregular light exposure were associated with later sleep timing, whereas only later timed light exposure was associated with later circadian phase. Personal light exposure patterns, particularly light timing, may contribute to delayed circadian rhythms in OCD. Circadian medicine treatments to address delays in OCD may benefit from prioritizing advancing light exposure timing.

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1068

FEAR OF MISSING OUT, PRE-SLEEP AROUSAL, BEDTIME PROCRASTINATION, AND SLEEP HEALTH: A SERIAL MODERATED MEDIATION ANALYSIS

Ruth Brombach¹, John Richmond Sy², Kearney Smith¹, Jessica Dietch¹

¹Oregon State University, ²University of Arizona

Introduction: Fear of missing out (FoMO) refers to anxiety an individual feels when they believe they are missing out on rewarding experience, social interaction, or information. FoMO has been associated with negative psychological and behavioral symptoms, problematic technology engagement, and poorer sleep health. However, the pathways through which FoMO influences sleep outcomes are not well understood. This study examined a serial moderated mediation model to determine whether pre-sleep arousal and bedtime procrastination accounted for associations between FoMO and sleep disturbance and sleep-related impairment and whether self-control and belongingness moderated these pathways.

Methods: Participants were 505 college students who completed validated measures of FoMO, pre-sleep arousal, bedtime procrastination, self-control, belongingness, sleep disturbance, and sleep-related impairment. Two structural equation models were estimated separately for each sleep outcome. Each model included pre-sleep arousal as the first mediator, bedtime procrastination as the second mediator, self-control as a moderator of the association between pre-sleep arousal and bedtime procrastination, and belongingness as a moderator of the association between FoMO and the sleep outcome. Models controlled for age and gender.

Results: FoMO was significantly associated with higher pre-sleep arousal in both models. Pre-sleep arousal was significantly associated with greater bedtime procrastination, and bedtime procrastination was significantly associated with both sleep disturbance and sleep-related impairment. Significant indirect effects were observed for the pathway from FoMO to pre-sleep arousal to each sleep outcome, along with significant serial indirect effects involving bedtime procrastination. Self-control moderated the association between pre-sleep arousal and bedtime procrastination, such that individuals with lower self-control demonstrated stronger bedtime procrastination. Belongingness moderated the

association between FoMO and sleep-related impairment but not sleep disturbance.

Conclusion: Findings suggest that FoMO contributes to poorer sleep health through elevated pre-sleep arousal and bedtime procrastination. Self-control and belongingness influenced the strength of the pathways, suggesting that difficulties in self-control and lower perceptions of belongingness may heighten susceptibility to FoMO-related sleep problems. Belongingness moderated the association between FoMO and sleep-related impairment, but not sleep disturbance, indicating that social connectedness may specifically buffer the daytime functional consequences of FoMO-related stress. These factors may therefore represent important targets for prevention and intervention efforts aimed at improving sleep health.

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1069

AN IMPULSIVE NIGHT OWL? LONGITUDINAL ASSOCIATIONS BETWEEN CHRONOTYPE, IMPULSIVITY, AND MOOD SYMPTOMS IN AN ADOLESCENT SAMPLE

Mackenzie Maddox¹, Rachel Walsh², Logan Smith¹, Phyllis Zee³, Robin Nusslock⁴, Lauren Alloy¹

¹Temple University, ²Massachusetts General Hospital/Harvard Medical School, ³Northwestern University Feinberg School of Medicine, ⁴Northwestern University

Introduction: Chronotype is an individual's preference for timing of daily activities relative to clock time. Evening chronotype is associated with higher levels of impulsivity, mood disorder diagnoses, and increased risk for mood disorders. Chronotype and impulsivity may interact to increase an individual's susceptibility to mood symptoms. However, much work involving chronotype is limited to a single facet of impulsivity as opposed to viewing this construct as multi-faceted. Thus, this study evaluated the associations between chronotype, three factors of impulsivity, and mood symptoms in an adolescent sample.

Methods: Adolescents ($N = 164$; mean age = 15.11) were recruited from the Philadelphia area as part of a larger longitudinal project investigating predictors of bipolar spectrum disorders. At baseline, participants completed self-report measures of chronotype (Morningness-Eveningness Questionnaire) and mood symptoms (Beck Depression Inventory and Child Mania Rating Scale-Revised). Six-months later, participants repeated mood symptom measures. Participants completed a measure of impulsivity (Three Factor Impulsivity index: two emotion-based and one non-emotion-based) either at baseline or follow-up with the time difference controlled. Hierarchical multiple regression was used to determine main and interaction effects. Baseline mood symptoms, age, and sex were included as covariates.

Results: Eveningness predicted greater hypo/manic symptoms at follow-up ($b = -.09$, $p < .001$), controlling for covariates. This same pattern was observed for depressive symptoms but was no longer significant after including covariates, specifically baseline depressive symptoms. One emotion-based impulsivity factor, feelings trigger action, significantly moderated the association between chronotype and hypo/manic symptoms such that greater levels of impulsivity strengthened the association between eveningness and greater hypo/manic symptoms ($b = -.07$, $p < .05$). The other two forms of impulsivity (pervasive influence of feelings and lack

of follow-through) did not significantly moderate these associations.

Conclusion: Eveningness predicted hypo/manic symptoms in an adolescent community sample. An externalizing form of emotion-based impulsivity strengthened the association between evening-type and hypo/manic symptoms, emphasizing the importance of viewing impulsivity through a more granular lens. Additional longitudinal work is needed to clarify the role of chronotype and multi-faceted impulsivity in the pathogenesis of mood disorders.

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1070

LINKS BETWEEN DISCRIMINATION-RELATED VIGILANCE, SLEEP DISTURBANCES, AND COPING BEHAVIORS IN ADOLESCENT POPULATIONS

Skyler Recel-Chang, Celia Roberto, Mary Carskadon, Anastacia Kudinova

Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University

Introduction: We define vigilance as an extreme state of awareness of a prospective threat, often associated with visible identities such as race and gender. Chronic vigilance has been shown to elevate stress and impair sleep quality in adults; however, the impact of vigilance on youth mental and physical health remains understudied. This project examined how vigilance, as a measure of limited empowerment, impacts adolescent mental health symptoms and sleep difficulties. We aimed to characterize distinct aspects of adolescent mental health, such as internalizing (e.g., sadness), externalizing (e.g., anger, irritability) symptoms, and attentional difficulties. We also examine the physiological components of high self-reported vigilance through altered circadian rhythms and insomnia.

Methods: Participants are adolescents ($n=52$) ages 12 to 18 years ($M=13.64$, $SD=1.08$), recruited from child and adolescent mental health hospitals and community-based settings in the Northeast. Participants and their caregivers completed a series of mental health surveys, including the Youth Pediatric Symptom Checklist (YPSC), the Racism-Related Vigilance Scale (RRVS), the Insomnia Severity Index (ISI), and the PROMIS Sleep Disturbance measure.

Results: A series of linear regressions showed that higher vigilance was associated with greater overall mental health symptoms ($\beta=0.73$, $SE=0.16$, $p<0.001$), including greater internalizing ($\beta=0.35$, $SE=0.07$, $p<0.001$) and attention problems ($\beta=0.27$, $SE=0.07$, $p<0.001$), but not externalizing problems ($p>0.05$). Participants with higher vigilance also showed higher levels of sleep problems ($\beta=0.73$, $SE=0.31$, $p=0.02$) and insomnia ($\beta=0.54$, $SE=0.19$, $p=0.01$).

Conclusion: These findings can expand our understanding of how social and structural factors may shape developmental trajectories in adolescent populations by impacting core mental and physical health. These implications of our findings may inform clinical practice for prevailing issues facing youth and contribute to improved approaches to mitigating sleep disturbance patterns.

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SLEEP, MENTAL HEALTH, AND PROTECTIVE FACTORS AMONG BLACK AND LATINA WOMEN OF CHILDBEARING AGE

Eileen Condon¹, Mollie Fleming², Lois Sadler³, D'Asia Hargrove¹, Ripley Hensley¹, Sangchoon Jeon³, Cassandra Murphy², Heather Reynolds³, Natalie J. Shook¹, Sherry Van Lange², Zequan Wang², Henry yaggi⁴, Chuanrong Zhang², Nancy Redeker⁵

¹UConn School of Nursing, ²University of Connecticut, ³Yale School of Nursing, ⁴Yale School of Medicine, ⁵Elisabeth DeLuca School of Nursing, University of Connecticut

Introduction: Sleep deficiency is associated with adverse pregnancy outcomes. Black and Latina women experience disproportionate psychosocial stressors and disparities in maternal-child outcomes, but sleep health among these women is poorly understood. The aims of this study are to (1) describe sleep health among Black and Latina women of childbearing age and (2) examine risk and protective factors for sleep among these women.

Methods: We used data from an ongoing cross-sectional study of sleep health among women age 18 to 49 years who self-identify as Black and/or Hispanic/Latina. Women self-reported sleep characteristics [Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI)] sleep-related daytime symptoms [Epworth Sleepiness Scale (ESS), PROMIS Fatigue], and sleep-related cognitions (Dysfunctional Beliefs and Attitudes about Sleep Scale). Women also reported their mental health (Center for Epidemiologic Studies Depression Scale, PROMIS Anxiety Scale, Perceived Stress Scale, Post-traumatic Stress Disorder Checklist) and protective factors (Brief Resilience Scale, Multidimensional Scale Of Perceived Social Support). We examined relationships between mental health and sleep using linear regression adjusted for demographics. We then tested whether these relationships were mediated by sleep-related cognitions or moderated by protective factors.

Results: Women ($N=209$, M age= 27.7 , $SD=8.79$ years) identified as Hispanic/Latina (49%), non-Hispanic Black (31%), Hispanic Black (10%), and multiracial (10%). Women frequently reported insomnia symptoms (50%, $ISI >7$), poor sleep quality (48%, $PSQI >5$), excessive daytime sleepiness (36%, $ESS >10$), and fatigue (52%, $t\text{-score} >55$). Depression (40%), anxiety (40%), stress (79%), PTSD symptoms (39%), and dysfunctional beliefs about sleep (53%) were also common. Mental health symptoms were associated with worse insomnia symptoms, poor sleep quality, and more sleep-related daytime symptoms ($\chi^2=.21-.52$; $ps<.001$). These relationships were partially mediated by dysfunctional beliefs and attitudes about sleep but were not buffered by social support or resilience.

Conclusion: Black and Latina women of childbearing age report significantly higher sleep and mental health challenges compared to the general United States population. Sleep-related cognitions may be a critical target for interventions to reduce sleep-related disparities among these women. Individual-level protective factors did not buffer the effects of mental health on sleep, highlighting the need for multi-level approaches to address social determinants of sleep health.

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1072

DIM LIGHT MELATONIN ONSET AND MOOD SYMPTOMS: CIRCADIAN TIMING IN A CLINICALLY-ENRICHED SAMPLE OF YOUNG ADULTSRachel Walsh¹, Mackenzie Maddox², Joshua Klugman², Namni Goel³, Lauren Alloy²¹Massachusetts General Hospital/Harvard Medical School,²Temple University, ³Rush University Medical Center

Introduction: Theoretical and empirical work supports circadian rhythm disruption in the pathogenesis of mood disorders. However, dim light melatonin onset (DLMO), the gold standard measure of circadian timing, has been understudied in relation to mood symptoms. This study evaluated DLMO timing and stability in a clinically-enriched young adult sample and tested associations between circadian timing indices and mood disorder symptoms.

Methods: Young adults ($n=124$; mean age = 21.9) with ($n=70$) and without ($n=54$) mood disorders completed a 20-day ecological momentary assessment (EMA) study. Participants reported hypomanic and depressive symptoms prior to beginning the EMA study, and thrice-daily via EMA. An at-home controlled DLMO procedure was completed on days 1, 10, and 20. Participants provided 10 saliva samples 30 minutes apart starting five hours prior to habitual bedtime while wearing light-attenuating goggles. DLMO stability was quantified using intraclass correlation coefficients (ICC) and within-person variability. Linear mixed models tested associations between DLMO, symptom severity, and the temporal pattern of mood symptoms.

Results: Mean DLMO for the sample was $22.01 \text{ h} \pm 1.44 \text{ h}$ (SD), demonstrating substantial stability ($\text{ICC} = 0.75$; 95% CI = 0.60–0.83). The mood disorder group exhibited a significantly earlier DLMO than controls ($b=-0.51$, $\text{SE}=0.24$, $p=.04$), but there were no differences in DLMO stability by diagnostic group. Hypomanic, but not depressive, symptoms were associated with later DLMO both cross-sectionally ($B = 0.20$, $\text{SE} = 0.09$, $p = .03$) and prospectively ($B=.24$, $\text{SE}=.09$, $p=.01$). Time-of-day analyses revealed distinct diurnal patterns for hypomanic, but not depressive symptoms; individuals with earlier DLMOs exhibited peaks in hypomanic symptoms around 1400 h, whereas those with later DLMOs reported peak symptom levels in the evening.

Conclusion: Circadian phase was stable over short periods in young adults, with earlier timing observed in those with mood disorders. Hypomanic symptoms were linked to later circadian timing and showed a distinct daily pattern. Incorporating objective measures of endogenous circadian rhythms may improve understanding of mood disorder episodes and inform targeted interventions.

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1073

HOW DO DAILY FLUCTUATIONS IN STRESS, ANXIETY, AND DEPRESSION RELATE TO SLEEP IN COLLEGE STUDENTS?Kelly Kim¹, Jacqueline Leete¹, Alisa Huskey¹, Ethan Olson², John Richmond Sy¹, Kiley Pauck³, Sarah Emert⁴, Ruth Brombach³, Kenneth Bottrill¹, Jessica Dietch³, Daniel Taylor¹¹University of Arizona, ²University of Texas Health Science Center at San Antonio, ³Oregon State University, ⁴Idaho State University

Introduction: College students face unique factors (e.g., academic and social demands, varied class schedules across days) that may put them at greater risk for mental health and sleep difficulties. Prior studies have shown that depression, anxiety, and stress are associated with sleep disturbances, but more studies utilizing repeated measures are needed to understand these relationships across more granular timescales. This study examined daily associations among stress, depression, anxiety, and sleep in college students.

Methods: 333 college students (Mage = 20 years, 54% Female, 81% Non-Hispanic/Latinx) from two universities in Tucson, AZ, and Corvallis, OR, completed 14-days of the Consensus Sleep Diary (CSD), Perceived Stress Scale-4 (PSS-4), Generalized Anxiety Disorder 2-item (GAD-2), and Patient Health Questionnaire-2 (PHQ-2). Multilevel models examined how stress (PSS-4 total), anxiety symptoms (GAD-2 total), and depression symptoms (PHQ-2 total) were associated with same-day sleep efficiency, duration, and timing.

Results: Between-person analyses revealed that, on average, students with greater depression reported lower sleep efficiency ($\beta = -0.87$, $\text{SE} = 0.41$, $p = 0.037$), while those with greater stress reported shorter sleep duration ($\beta = -4.06$, $\text{SE} = 1.88$, $p = 0.031$). Within-person analyses revealed that, when students experienced greater than usual anxiety symptoms, they reported worse sleep efficiency ($\beta = -0.41$, $\text{SE} = 0.16$, $p = 0.010$) and lower sleep duration ($\beta = -4.20$, $\text{SE} = 1.85$, $p = 0.023$) on the same day. When students experienced greater than usual stress, they reported shorter sleep duration ($\beta = -2.07$, $\text{SE} = 0.94$, $p = 0.027$). When students experienced greater than usual depressive symptoms, they reported longer sleep duration ($\beta = 5.39$, $\text{SE} = 2.05$, $p = 0.009$) and later sleep midpoint ($\beta = 15.00$, $\text{SE} = 5.69$, $p = 0.009$).

Conclusion: Results reveal that daily elevations in stress and anxiety are associated with shorter or less efficient sleep, whereas elevation in depressive symptoms is associated with longer and later sleep in college students. Findings extend past research by highlighting the utility of using repeated measurements to characterize the differential relationships among stress, anxiety, depression, and sleep in college students.

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1074

BRIGHTER OUTLOOK, BETTER SLEEP, BALANCED HEALTH: EXAMINING HOW SLEEP CONNECTS OPTIMISM TO LESS PAIN, STRESS, AND DEPRESSION IN FIBROMYALGIA

Daniel Westwood¹, Heather Altier², Fuschia Sirois³, Jameson Hirsch⁴

¹Department of Psychiatry and Behavioral Sciences, Quillen College of Medicine, East Tennessee State University, ²Johns Hopkins University School of Medicine, Department of Psychiatry and Behavioral Sciences, ³Department of Psychology, Durham University, ⁴East Tennessee State University

Introduction: Depression is prevalent in fibromyalgia (FM), a chronic condition characterized by fatigue, widespread pain, and disrupted sleep. While poor sleep exacerbates stress, pain, and psychopathology, maintaining a sense of optimism – conceptualized as a stable positive attitude about the future and tendency to anticipate favorable outcomes – may mitigate such negative effects. We hypothesized that greater optimism, and less pessimism, would be related to less depression, and that these associations would be serially mediated by sleep disturbances and, subsequently, by stress and pain, in parallel.

Methods: Adult respondents with fibromyalgia (N=406; Mean age=47.8, SD=12.95; 95% female, N=398), were recruited nationally (U.S.) through FM advocacy groups, support organizations, and social media. Participants completed validated measures of optimism/pessimism, sleep quality, perceived stress and depression, and pain. We conducted Pearsons product moment correlation analyses, and serial mediation analyses (PROCESS Model 81) assessing the indirect effects of sleep disturbance (M₁), stress (M₂), and pain (M₃), on the associations between optimism/pessimism and depression (in separate models), controlling for demographics.

Results: At the bivariate level, optimism was inversely related to all other variables which, themselves, were positively related. At the multivariate level, greater optimism and less pessimism were associated with less sleep disturbance and, in turn, less stress and pain and, finally, less depression (all p-values < .01). Specific indirect effects linking optimism/pessimism to depression also occurred via sleep disturbance and stress, but not pain.

Conclusion: Our findings highlight sleep disturbance as a central mechanism connecting cognitive-emotional outlook to psychosomatic outcomes in fibromyalgia. Optimists often use active, problem-focused coping (e.g., approach-oriented) and more adaptive cognitive styles (e.g., positive reframing, acceptance), supporting healthier behaviors and positive emotions. In contrast, pessimists often use avoidant or emotion-focused coping, which can exacerbate rumination and disrupt relationships, thereby contributing to a maladaptive cycle of sleep dysfunction, heightened stress and pain, and worsening psychological symptoms. Providers should consider strategies to bolster optimism and reduce pessimism (e.g., cognitive behavioral therapy [CBT]; Best Possible Self exercise), while also addressing sleep and depression

directly (e.g., CBT for Insomnia; pharmacotherapy), to improve mental and physical health in patients with fibromyalgia.

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1075

DATA-DRIVEN SLEEP PHENOTYPES AND ASSOCIATED PSYCHOLOGICAL CHARACTERISTICS IN PAINFUL TEMPOROMANDIBULAR DISORDERS

Soamy Montesino Goicolea, Margarete Ribeiro Dasilva, Yenisel Cruz-Almeida
University of Florida

Introduction: Chronic orofacial pain, including temporomandibular disorders (TMD), is influenced by sleep disturbance and psychological distress, both of which contribute to pain vulnerability and maintenance. However, subjective sleep patterns are heterogeneous, and the psychological characteristics associated with distinct sleep profiles remain unclear. Identifying these phenotypes may clarify biopsychosocial mechanisms relevant to chronic pain.

Methods: Eighty-four adults (TMD pain and controls) completed the Pittsburgh Sleep Quality Index (PSQI), SCL-90-R subscales, PANAS, Brief Vulnerability Scale, and STAI-T. PSQI components were entered into a principal component analysis followed by hierarchical clustering (Ward's method). A three-cluster solution emerged; Cluster 2 (n=4) was excluded due to minimal sample size. Analyses focused on Cluster 1 (Multidomain Sleep Disturbance Profile; n=38) and Cluster 3 (Low-Disturbance Sleep Profile; n=42). Sleep differences were examined using ANOVAs. A MANOVA tested overall psychological differences, followed by univariate ANOVAs with Bonferroni correction.

Results: Cluster membership differed significantly by TMD pain status ($\chi^2(1)=8.77$, $p=0.003$), with more pain participants in Cluster 1. The MANOVA was significant (Pillai's Trace=0.39, $F(17,62)=2.65$, $p=0.004$), indicating a distinct multivariate psychological profile. Follow-up ANOVAs showed that Cluster 1 demonstrated higher somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, negative affect, and global distress after Bonferroni correction. Cluster 3 demonstrated the lowest overall symptom burden. Participants in the Multidomain Sleep Disturbance Profile exhibited greater psychological distress and were more likely to report TMD pain, whereas individuals in the Low-Disturbance Sleep Profile reported fewer symptoms and demonstrated a more resilient psychological pattern.

Conclusion: Poorer sleep quality was associated with elevated psychological symptoms and greater likelihood of TMD pain, whereas good sleepers exhibited fewer symptoms and markers of resilience. These findings highlight meaningful sleep-psychological phenotypes that may inform mechanisms of vulnerability and resilience in TMJ-related pain. Understanding

distinct sleep profiles may support more targeted approaches to assessment and intervention in chronic orofacial pain.

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1076

DOES SHIFT-WORK MODERATE THE RELATIONSHIP BETWEEN SLEEP DISTURBANCES AND ANXIETY SYMPTOMS?

Nini Yang¹, Kelly Kim¹, Daniel Taylor¹, Danica Slavish², Jessica Dietch³, Brett Messman², Camilo Ruggero⁴

¹University of Arizona, ²University of North Texas, ³Oregon State University, ⁴University of Texas at Dallas

Introduction: Shift-working nurses routinely encounter circadian misalignment and occupational stress, factors that may contribute to disrupted sleep and greater psychological distress. Substantial evidence shows that anxiety and sleep disturbance frequently co-occur, yet it remains unclear whether shift-work status alters the strength of this association. Because shift-working nurses operate under chronically unstable circadian conditions, one possibility is that the anxiety-sleep relationship may be stronger among shift workers compared to non-shift workers.

Methods: A sample of 477 nurses completed the survey. Of these, 162 nurses (35.7%; rounded to 36%) worked night shifts, and 292 nurses (64.3%) worked non night shifts. The Pittsburgh Sleep Quality Index (PSQI) and the Generalized Anxiety Disorder-7 (GAD-7) were completed. Linear regression models were used to examine the association between anxiety symptoms and sleep disturbance, as well as whether shift-work status moderated this association. Both unadjusted and covariate-adjusted models were evaluated.

Results: Higher anxiety levels were associated with greater sleep disturbance ($\beta = 0.20$, SE = 0.036, 95% CI [0.13, 0.27], $p < .001$). Shift-work status showed a small positive association with sleep disturbance ($\beta = 0.64$, $p = .062$), though this association was not statistically significant. The interaction between anxiety and shift-work status was also non-significant, indicating that the strength of the anxiety-sleep relationship was similar for shift-working and non-shift- working nurses.

Conclusion: Anxiety was consistently associated with poorer sleep quality among nurses, regardless of shift- work status. Although shift-working nurses exhibited slightly higher sleep disturbance overall, shift-work did not alter the association between anxiety and sleep. Interventions that address anxiety—such as CBT, MBCT, and stress-regulation strategies—may therefore support sleep health across nursing roles. Future studies should examine PSQI component scores and longitudinal patterns to clarify whether specific aspects of sleep are more sensitive to shift- related demands.

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1077

EARLY IMPROVEMENTS IN MENTAL HEALTH WITH PAP THERAPY IN OSA: A LARGE PATIENT EXPERIENCE SURVEY

Anita Malik¹, Will McConnell¹, Vy Vuong¹, Caleb Woodford¹, Fatima Sert¹, Crystal Kuy¹, Kimberly Sterling¹, Leanne Kaye²

¹Resmed Science Center, ²Resmed

Introduction: Individuals with obstructive sleep apnea (OSA) are at increased risk for mental health disorders including depression and anxiety. Positive airway pressure (PAP) is the first-line treatment for OSA, but its potential to mitigate mental health burden is not well studied. Thus, we evaluated the impact of PAP therapy on mental and emotional well-being and how outcomes differ by gender.

Methods: A cross-sectional study was conducted among adults (18+ years) residing in the United States and using PAP therapy (Resmed) for OSA treatment. Participants completed an online survey on pre- and post-therapy emotional well-being and mental health symptoms, as well as post-therapy time to perceived improvement. Changes in symptoms were rated on a 5-point Likert scale (1 = significantly worsened; 5 = significantly improved). Time to "significant" improvement was assessed using a time scale. Descriptive statistics were used to quantify outcomes for the overall sample with pre-symptoms accounting for any burden. Change analyses were limited to "significant" or "severe" pre-therapy responses, and "significantly improved" post-therapy responses. Standard comparative statistical analyses examined gender differences.

Results: 1,880 respondents were included in the analysis (mean age: 56.0 years, 54.6% female, 44.4% with severe OSA; 48% on PAP therapy < 30 days). High rates of pre-therapy mental health and emotional well-being symptoms were reported: stress (83.0%), irritability (81.1%), mood (75.9%), worry (75.7%), anxiety (74.6%), and depression (60.3%). Low motivation (17.2%) and general happiness (30.2%) were also reported. Females reported all pre-therapy symptoms at a greater frequency than males (all $p < 0.001$). Within the "first few days" of PAP initiation, respondents with a "significant" or "severe" symptom pre-therapy reported a "significant improvement" in stress (48%), irritability (46%), mood (50%), worry (50%), anxiety (56%), depression (37%), motivation (50%), and general happiness (54%). Continued symptom improvement was reported up to one-year post-therapy initiation, with no significant differences by gender ($p > 0.05$).

Conclusion: PAP therapy was associated with early perceived mental health and emotional well-being. While females experienced higher rates of pre-therapy symptoms, there were no gender differences in improvements post-therapy nor in time to improvement. These findings may inform strategies to personalize OSA management and support continued PAP usage.

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1078

EXAMINING THE ROLE OF INSOMNIA SEVERITY AS A POTENTIAL MEDIATOR BETWEEN PSYCHOSOCIAL AND ENVIRONMENTAL FACTORS AND CARDIOMETABOLIC RISK AMONG BLACKS

Michelle Thompson¹, Zihao Wang², Joon Chung², Clarence Earl Locklear², Debbie Chung³, Azizi Seixas³, Carla Gibbs², Monique S. Balthazar⁴, Mark Bernard⁵, Girardin Jean-Louis³

¹Lehigh University, ²University of Miami Miller School of Medicine, ³University of Miami, ⁴Ross and Carol Nese College of Nursing, Pennsylvania State University, ⁵Department of Neurology, NYU Langone Health

Introduction: Adequate sleep is a key determinant of cardiometabolic health, but epidemiologic evidence among Black

adults (BA) remains limited. Psychosocial and neighborhood-level stressors may influence cardiometabolic risk (CMR) directly and through the presence of insomnia. We examined associations of psychosocial and environmental stressors with CMR, associations with insomnia severity, and whether the presence of insomnia mediates these relationships.

Methods: Cross-sectional data from the ESSENTIAL study were analyzed from 623 BA residing in Miami and New York City (66% female; Mage=40.3, SD= 13.2 [range 18-75 years old]). Insomnia severity was measured with the Insomnia Severity Index (ISI). Psychosocial determinants included social support (Multidimensional Scale of Perceived Social Support), discrimination (Everyday Discrimination Scale), life stressors (Holmes and Rahe Stress Scale), and mental health (SF-12, history of anxiety/depression). Environmental determinants were assessed with the Assessment of Sleep Environment (ASE) and the Neighborhood Environment Walkability Scale-Abbreviated (NEWS-A) indices (residential density & crime). CMR included a history of cardiometabolic risk diagnosis. Unadjusted and adjusted linear regression models identified independent associations of psychosocial and environmental factors (predictors) with ISI (outcome). Mediation analyses for key exposures estimated the indirect (via ISI) and direct effects on CMR. Covariates included age, sex, education, employment, marital status, religious affiliation, income, and location.

Results: In fully adjusted models, worse mental health ($\beta=-0.24$, $p<.01$), a more disruptive sleep environment (ASE; $\beta=0.10$, $p<0.01$), higher neighborhood crime, and greater residential density (NEWS-A; $\beta=0.59$, $p<.05$ and $\beta=0.0030$, $p<0.05$) were independently associated with higher ISI. Older age ($\beta=0.09$, $p<0.001$) and female sex ($\beta=1.15$, $p<0.05$) were also independently associated with higher ISI. For CMR, mental health ($\beta=0.59$, $p<0.05$), sleep environment ($\beta=0.59$, $p<.05$), and neighborhood crime ($\beta=0.59$, $p<0.05$) showed significant direct associations with CMR. We found no significant indirect effects of ISI in the model.

Conclusion: These findings underscore the need for culturally tailored precision medicine-based interventions that target key factors such as mental health, sleep and environments to mitigate CMR among BA. Future studies should employ longitudinal methods with larger sample sizes to establish causal relationships with these determinants of sleep and CMR outcomes in Black communities and other populations experiencing similar neighborhood disadvantage.

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1079

PREVALENCE AND CORRELATES OF SHORT SLEEP IN U.S. ADULTS: FINDINGS FROM THE 2023 HINTS SURVEY

Mamatha Vodapally¹, Lourdes DelRosso²

¹Adventist Health Hanford Family Medicine, ²University of California San Francisco

Introduction: Insufficient and irregular sleep are common in the United States and are linked to adverse health outcomes. Yet, nationally representative data on behavioral and psychosocial correlates of sleep remain limited. This study examined weekday and weekend sleep duration, short sleep prevalence, and social jetlag among U.S. adults.

Methods: We analyzed data from the 2023 Health Information National Trends Survey (HINTS 7). Weekday and weekend sleep duration were self-reported. Short sleep was defined as < 7

hours on weekdays. Social jetlag was calculated as the difference between weekend and weekday sleep. Logistic regression identified correlates of short sleep; linear regression examined predictors of weekday sleep, weekend sleep, and social jetlag.

Results: From the 7200 participants, 52% were women and 48% were men. The mean weekday sleep was 6.31 hours (95% CI: 6.22–6.40), mean weekend sleep was 6.89 hours (95% CI: 6.79–6.99), and average social jetlag was 0.57 hours (95% CI: 0.48–0.66). Overall, 34.9% (95% CI: 33.0–36.8) of adults reported short weekday sleep. In adjusted models, depression diagnosis was associated with longer weekday sleep (+0.65 hours, $p<0.01$) and lower odds of short sleep (OR=0.72, 95% CI: 0.55–0.93). Anxiety symptoms were linked to higher odds of short sleep (OR=1.41, 95% CI: 1.05–1.89). Greater frequency of moderate exercise was associated with longer sleep (+0.12 hours per day, $p<0.05$) and reduced odds of short sleep (OR=0.86 per day, 95% CI: 0.76–0.97). Strength training showed a similar protective association (OR=0.89 per day, 95% CI: 0.80–0.99). Hispanic ethnicity predicted longer sleep (+0.25 hours, $p<0.05$). Neither marijuana use nor sexual orientation was significantly associated with sleep outcomes. No strong predictors of social jetlag were identified.

Conclusion: In this nationally representative study, one-third of U.S. adults reported insufficient weekday sleep. Physical activity was consistently protective, while anxiety increased risk of short sleep. Depression diagnosis was paradoxically associated with longer sleep. There were no predictors of social jet lag.

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PSILOCYBIN ELICITS NON-LINEAR NIGHT TO NIGHT CHANGES IN SLEEP SPECTRAL POWER

Matthew Reid¹, Eli Weisman², Luis Luna Martinez³, William Coon⁴, Frederick Barrett²

¹Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, ²Johns Hopkins University School of Medicine, ³Johns Hopkins University, ⁴Johns Hopkins University Applied Physics Laboratory

Introduction: Despite evidence of an acute effect of psilocybin on sleep physiology, its enduring effects beyond the period of acute administration and active metabolism remain unexplored. Within a clinical trial of psilocybin-assisted therapy for alcohol use disorder comorbid with major depressive disorder, we monitored sleep for ten continuous nights (3 pre-dose | 7 post-dose) in participants (N=22) undergoing an open-label psilocybin-dosing session.

Methods: We obtained two frontal bipolar-derivations (AF7-FPZ & AF8-FPZ) of sleep-EEG to quantify whole-night power spectral density (PSD). Artifactual epochs (30s) were rejected automatically using our validated convolutional neural network (CNN) based sleep-state classifier ('ezscore-f') before deriving whole-night PSD ($10 \cdot \log_{10} \mu V^2/Hz$) in canonical bands (SWA: 0.5-2Hz, Delta2: 2-4Hz, Theta: 4-8Hz, Alpha: 8-13Hz, Sigma: 13-15Hz, beta: 18-30Hz) from 30s-windowed multitaper spectral analyses using six orthogonal tapers. Night-to-night (N-2 to N+7) changes in PSD displayed evidence of curvilinear trajectories and were modeled through mixed-effects growth-curve models, using 3rd-degree polynomial spline terms with participant-specific random intercepts.

Results: Across all models, between-participant variance of random intercepts was small (mean ICC=0.66), indicating consistent baseline spectral levels. SWAPSD, ThetaPSD, and AlphaPSD

showed no evidence of systematic change, with all spline terms non-significant (all $p > 0.15$), suggesting stable dynamics across nights. In contrast, Delta2PSD showed low-order curvature, with two natural spline (ns) components reaching significance (ns1: $p = 0.009$; ns2: $p = 0.042$), consistent with an increase in nights following dosing followed by stabilization. SigmaPSD demonstrated a similar pattern, with a significant second-order spline component ($p = 0.017$) and a third-order spline component approaching significance ($p = 0.067$). BetaPSD likewise exhibited a small but detectable nonlinear fluctuation, with a significant second-order spline term (ns2: $p = 0.024$). First-derivative estimates from fitted trajectories suggested that Delta2PSD approached its peak at night-five, and subsequently trended toward baseline, whereas SigmaPSD and BetaPSD approached local maxima on night-three, yet values remained above baseline thereafter.

Conclusion: While SWA, Theta, & Alpha remained stable across nights, night-to-night variability in delta2, sigma, and beta bands were observed characterized by subtle early increases that did not persist across the full observation window.

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1081

PSYCHIATRIC SYMPTOMS AND NICOTINE USE IN INSOMNIA FOLLOWING TRAUMATIC BRAIN INJURY

Eleanor Steffens¹, Eunyeong Joo², Lauren McEachin², Jim Stone², Heather Altier³, Hannah Maybrier¹, Michael Smith³, Luis Buenaver³

¹Johns Hopkins University School of Medicine, ²Johns Hopkins School of Medicine, ³Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine

Introduction: Insomnia following Traumatic Brain Injury (TBI; TBI insomnia) is a common problem, with prospective studies finding that more than half of individuals developed insomnia within the first three months of injury. Individuals with TBI are also at higher risk for psychiatric symptom development and demonstrate greater nicotine use (OR= 2.15) compared to individuals without a history of TBI. Nicotine use is further associated with disrupted sleep, negatively impacting sleep through its effects on arousal-promoting neurotransmitters (e.g., dopamine, norepinephrine, acetylcholine, etc.), sympathetic nervous system activation, potential circadian dysregulation, and sleep architecture disruption. And yet, despite greater rates of psychiatric symptoms and nicotine use following TBI and the deleterious impacts of nicotine use on sleep, to our knowledge no work has explored the associations of nicotine status and psychiatric symptoms with sleep in individuals with TBI insomnia.

Methods: We analyzed baseline data from a community sample of TBI patients with insomnia (N=48, Mage=39.8 ±12.9, 65% female) enrolled in a parent RCT comparing 4-session CBT-I to sleep education. Participants self-reported nicotine use, with 15% and 17% (N=7 and 8) endorsing current and former nicotine use. Hierarchical multiple regression examined the associations between 1) psychiatric symptoms and subjective sleep quality and 2) psychiatric symptoms, nicotine use status, and subjective sleep quality.

Results: On average, participants endorsed mild anxiety symptoms (MGAD-7: 6.4 ±5.2), moderate depressive symptoms (MPHQ-9: 10.1 ±5.2), and poor sleep quality (MPSQI: 12.4 ±3.2). In the initial model, psychiatric symptoms were significantly associated with worse subjective sleep quality ($F(2, 45) = 6.33$, $p = 0.004$, $R^2 = 0.22$). Adding nicotine use status in the second model significantly improved model fit ($p = 0.03$, $\Delta R^2 = 0.11$). After adjusting for psychiatric symptoms, subjective sleep quality differed significantly by nicotine use status, with current nicotine users reporting significantly worse sleep quality than never users ($p = 0.041$).

Conclusion: Individuals with TBI insomnia who currently use nicotine are at greater risk for worse sleep quality and greater sleep disturbances, even after accounting for co-occurring anxiety and depressive symptoms. These findings highlight the importance of targeted screening and policy efforts to reduce nicotine exposure, address psychiatric symptoms, and improve insomnia outcomes following TBI.

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1082

SLEEP DURATION AND PSYCHOLOGICAL DISTRESS: MENTAL HEALTH DISPARITIES AMONG ASIAN AMERICAN ADULTS, NATIONAL HEALTH INTERVIEW SURVEY 2006–2018

Shreya Gunda, Wendy Yangyiran Xie, Sukhman Parhar, Miguel E.V. Rodriguez, Armaan Jamal, George Hung, Nick Kikuta, Robert Huang, Gloria Kim, Latha Palaniappan, Nitya Rajeshuni, Malathi Srinivasan, Lauren Eggart
Stanford University, Center for Asian Health Research and Education (CARE)

Introduction: Short (< 7h) and long sleep (>8h) have been linked to poor mental health. Short sleep disrupts brain regions regulating emotion, while long sleep may reflect underlying chronic illness. Asian Americans (AAs) report higher prevalence of insufficient sleep than non-Hispanic Whites (NHWs), yet differences among subgroups remain understudied. We examined the relationship between sleep duration and moderate to severe psychological distress across disaggregated AA subgroups.

Methods: We analyzed 2006–2018 National Health Interview Survey data (N=880,210; 523,148 NHWs; 58,283 AAs: 12,056 Chinese, 13,211 Filipino, 11,249 Asian Indian, 21,767 Other Asian). Sleep was categorized as short (< 7h), ideal (7–8h), or long (>8h). Psychological distress was measured using the validated Kessler Psychological Distress Scale (K6), dichotomized as moderate/severe distress ($K6 \geq 5$) versus no distress (< 5). Weighted multivariate logistic regressions estimated odds ratios, adjusting for sociodemographic, socioeconomic, behavioral, and health covariates. Analyses were stratified by race/ethnicity.

Results: Short sleep was associated with higher odds of psychological distress (OR=1.87, 95% CI: 1.82–1.92), as was long sleep (OR=1.54, 95% CI: 1.48–1.61). Aggregating all AAs, the short sleep–distress association did not differ significantly from NHWs (OR=0.98, 95% CI: 0.89–1.08), while the long sleep–distress association was weaker (OR=0.81, 95% CI: 0.66–0.98). Subgroup analyses revealed heterogeneity. Chinese adults showed weaker associations for short sleep ($p = 0.038$), and Other Asian adults for long sleep ($p = 0.046$). No significant differences were found for Filipino or Indian adults. Covariates strongly linked to distress included poor self-rated health (OR=3.27, 95% CI: 3.11–3.44), low income

(<\$35,000 vs >\$75,000; OR=2.05, 95% CI: 1.95–2.16), female sex (OR=1.42, 95% CI: 1.36–1.48), and chronic condition (OR=1.63, 95% CI: 1.56–1.71).

Conclusion: Sleep duration is strongly associated with psychological distress among U.S. adults, but magnitudes vary across AA subgroups. Aggregating AAs obscures important heterogeneity in sleep and mental health associations. Findings underscore the importance of disaggregated data and culturally competent interventions addressing sleep health and mental well-being within AA communities.

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1083

SLEEP HEALTH AS A BUFFER BETWEEN FOOD INSECURITY AND DEPRESSION IN U.S. ADULTS: NHANES 2017–MARCH 2020

Shaurya Bisht¹, Gautham Agilan²

¹Thomas Jefferson High School for Science and Technology,

²Oneria

Introduction: Food insecurity and poor sleep are individually linked with depression, but their joint relationship within the US adult population is not fully characterized. This study investigated whether having multifaceted sleep health impacts the relationship between household food insecurity and symptoms of depression.

Methods: Participants were adults, aged 20 years or older, participating in the National Health and Nutrition Examination Survey from 2017 to March 2020 (analysis: n=5,692; weighted N ≈174,194,776). Food insecurity within households was classified as secure, versus low/very low. Sleep health was defined with a sleep pattern score, rated 0 to 3, accounting for short or long sleep, trouble sleeping, and frequent daytime sleepiness, categorized as healthy, intermediate, or poor. Depressive symptoms were PHQ-9 scores ≥10. Survey-weighted logistic regression with cluster-robust standard errors estimated odds ratios (ORs) and 95% confidence intervals (CIs) for depression by food insecurity, sleep pattern, and their interaction, adjusting for sociodemographic variables. Additive interaction between poor sleep and food insecurity was assessed using the relative excess risk due to interaction (RERI) and attributable proportion (AP).

Results: Weighted prevalences were 17.2% for low/very low food security, 6.3% for poor sleep pattern, and 9.2% for PHQ-9 ≥10. Food insecurity was significantly associated with increased odds of depression (OR=2.24, 95% CI=1.48–3.39). Compared with healthy sleepers, intermediate and poor sleepers had much higher odds (OR=3.88, 95% CI=2.61–5.79, and OR=19.62, 95% CI=18.71–20.57, respectively). Food insecurity interacted significantly with sleep patterns (joint p < 0.001); ORs for food insecurity compared with security were 2.21, 2.42, and 1.62 for healthy, intermediate, and poor sleepers, respectively. Additive measures of interaction suggested supra-additive interaction effects (RERI=3.08, 95% CI=−6.66–12.83, AP=0.24, 95% CI=−0.49–0.98). However, all CIs were compatible with zero. Adjustment for sleep pattern reduced the OR of interest from 2.45 to 2.24 (15% attenuation).

Conclusion: Food insecurity as well as sleep health issues both contribute to depression risk in U.S. adults. The correlation between food insecurity and depression varied across sleep

patterns and was strongest in adults with intermediate sleep health and those with lower income. Multidimensional sleep health may offer a modifiable solution, together with structural solutions for addressing food insecurity, for mitigating depression.

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1084

TENSION, ANXIETY, AND INSOMNIA SYMPTOMS AMONG GENERATION 1.5-2 SOUTH ASIANS

Nishka Gupta¹, Mika Hirata², Rebecca Campbell¹, Kathleen Reardon³

¹Bowling Green State University, ²Bowling Green State

University/ Henry Ford Health, ³Cleveland State University

Introduction: Anxiety and insomnia are positively bidirectionally related (Xue et al., 2025). However, culturally specific expressions of anxiety are understudied among South Asians. Since South Asians experience distress somatically and standardized anxiety measures lack somatic emphasis, underreporting can occur (Karasz et al., 2013). Tension is a culturally relevant measure of anxiety that captures somatization (Weaver & Karasz, 2022). We investigated somatic and psychological anxiety symptoms' relation to reported insomnia among South Asians.

Methods: Eighty-two South Asian adults (Mage = 27.78) were recruited using Cleveland State University's SONA and social media. Participants were generation 1.5 (immigrated before age 12) or 2nd generation (U.S. born). South Asian countries included: Afghanistan (2.4%), Bangladesh (6%), India (74.7%), Sri Lanka (1.2%), and Pakistan (12%) and 3.6% undisclosed. Participants completed the Tension Scale (24 items; $\alpha = 0.91$), and GAD-7 (7 items; $\alpha = 0.91$).

Results: We conducted an exploratory analysis testing the relation between self-reported insomnia (Tension Scale) and somatic/psychological symptoms from the Tension Scale and GAD-7, applying false discovery rate corrections. Reported insomnia correlated positively with most Tension symptoms ($p < 0.05$); Emotional (sadness, anxiousness, anger, helplessness [$r = 0.29 - 0.43$]), Somatic (stomach issues, headaches, pain in body, chest pains, breathlessness, dizziness, shakiness, coldness, hair turning white/falling out, loss of control of hands/feet, and period problems [$r = 0.24 - 0.40$]), and Cognitive/Behavioral (trouble concentrating, feelings of running away, tiredness, and wanting to be alone [$r = 0.36 - 0.50$]), but not vaginal discharge, feeling hot, sexual problems and homesickness. Reported insomnia correlated positively with most GAD-7 symptoms ($p < 0.05$); fear something awful may happen, non-stop worry, nervousness, restlessness, difficulty relaxing, and excessive worry ($r = 0.28 - 0.42$), but not irritability.

Conclusion: Across anxiety measures, self-reported insomnia was significantly associated with somatic and psychological symptoms. The GAD-7 lacks somatic emphasis which the Tension scale encapsulates. The relation between somatic anxiety symptoms and self-reported insomnia suggests physiological concerns to target when addressing sleep related issues. Somatization in South Asians are better captured by the Tension scale than the GAD-7. Future studies should investigate causality of sleep pathology and somatic symptoms.

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1085

THE ROLE OF SEXUAL ORIENTATION AND RACE ON DEPRESSION AMONG PARTICIPANTS WITH INSOMNIA

Miranda Foster¹, Ishana Kapoor², Marleigh Tregger³,
David Kalmbach⁴, Philip Cheng²

¹Henry Ford Health Sciences Center, ²Henry Ford Health System,

³Henry Ford Sleep Research, ⁴Henry Ford Health

Introduction: Insomnia is a well-established risk factor for depression. Prior research has shown that social discrimination drives disparities in insomnia, leading to worse sleep in marginalized populations such as Black Americans and sexual minorities (Lesbian, Gay, Bisexual, and Queer+ [LGBQ+]). By extension, it may be that Black and LGBQ+ Americans who develop insomnia may also experience greater risk for insomnia; however, this has not been examined. This study compared rates of comorbid depression by race and sexual orientation in patients with insomnia.

Methods: Participants with insomnia completed a survey assessing depression, experiences with discrimination, race, and sexual orientation. Sexual orientation and race were used to further classify groups into Black LGBQ+ (n=27), White LGBQ+ (n=91), Black heterosexual (n=128), and White heterosexual (n=291). Data analysis included chi-square analysis, two-way ANOVA, and post-hoc t-tests to examine group differences in depression and discrimination between Black LGBQ+, Black heterosexuals, White LGBQ+, and White heterosexuals with insomnia.

Results: Depression was significantly higher among LGBQ+ participants than heterosexual participants, regardless of race. Specifically, 70.4% of Black LGBQ+ participants demonstrated clinical depression compared to 44.5% of Black heterosexuals. Similarly, 76.9% of White LGBQ+ participants reported clinical depression compared to 55.7% of White heterosexuals. Subsequent t-tests revealed Black LGBQ+ participants (M=12.1, SD=2.6) had significantly less depression symptoms compared to White LGBQ+ (M=13.6, SD=3.5) participants despite similar, non-significantly different levels of discrimination experienced by White LGBQ+ participants (M=7.6, SD=3.7) as Black LGBQ+ participants (M=8.9, SD=4.3).

Conclusion: These findings suggest LGBQ+ people may experience a unique vulnerability to comorbid depression and insomnia. Furthermore, consistent with the Black-White Paradox of mental health, Black racial identity may play a protective role against comorbid depression in insomnia. Future studies should investigate possible mechanisms underlying co-morbid depression and insomnia in LGBQ+ communities and consider other intersecting marginalized identities that may have cascading effects on sleep and wellbeing.

Support (if any):

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1086

TWENTY-YEAR TRAJECTORIES OF WORRY-RELATED SLEEP PROBLEMS AND THEIR ASSOCIATIONS WITH NEGATIVE AFFECT, SELF-ACCEPTANCE, AND POSITIVE RELATIONS

Eunjin Tracy

University of Missouri

Introduction: Worry-related sleep problems—difficulty falling or staying asleep due to intrusive thoughts—reflect heightened cognitive-emotional hyperarousal that impairs emotion regulation and fosters negative, self-focused thinking. Although sleep disturbances are consistently associated with higher negative affect, less is known about how worry-driven sleep problems relate to broader dimensions of psychological and social well-being, such as self-acceptance and positive relations with others. Prior studies have mainly emphasized between-person differences, leaving a critical gap in understanding how within-person fluctuations in worry-related sleep problems correspond to changes in well-being. The present study addresses this gap by examining 20-year trajectories of worry-related sleep problems and evaluating their distinct within- and between-person associations with negative affect, self-acceptance, and positive relations across adulthood.

Methods: This study utilized three waves of data from the Midlife in the United States Study (MIDUS; N = 1,605; ages 24–74 at baseline; 58.9% female). Two forms of worry-related sleep problems were assessed: difficulty falling asleep and difficulty staying asleep. Linear growth models estimated trajectories of worry-related sleep problems over 20 years, and two-level multilevel models evaluated within-person and between-person associations between worry-related sleep problems and negative affect, self-acceptance, and positive relations, controlling for baseline age, education, sex, race, and ethnicity.

Results: Worry-related sleep initiation (p = .002) and maintenance problems (p < .001) increased as participants aged. Higher sleep initiation problems were associated with higher negative affect, lower self-acceptance, and lower positive relations at both within-person and between-person levels (all ps < .001). Higher sleep maintenance problems were associated with higher negative affect at both levels (all ps < .001) and with lower self-acceptance and lower positive relations at the between-person level (all ps < .001).

Conclusion: Trajectories indicated that worry-related sleep problems worsen with age across adulthood. Between-person effects showed consistently poorer well-being among adults with chronically higher worry-driven sleep problems. Within-person fluctuations were associated with higher negative affect, lower self-acceptance, and lower positive relations with others, suggesting the importance of monitoring changes in these sleep problems. These findings suggest that interventions targeting worry, hyperarousal, and sleep-related behavioral patterns—such as cognitive behavioral therapy for insomnia (CBT-I)—may help support emotional, psychological, and interpersonal well-being across adulthood.

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1087

DEPRESSION, SLEEP QUALITY, AND COGNITIVE CONTROL AMONG OLDER BLACK ADULTS

Eve T. Siebert¹, Carolina Scaramutti², Azizi Seixas², Debbie Chung²,
Yvette Williams¹, Guithelle Ruiz-Nicolas¹, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami

Introduction: Depression is associated with sleep disturbances and impairments in cognitive control, which disproportionately affect older Black adults. This study assessed whether sleep health and cognitive performance add incremental predictive

value for depression beyond demographic factors using a hierarchical model.

Methods: Data were collected from 710 participants enrolled in the NIH-funded PRAISE and MOSAIC studies. Participants were Black older adults ages 55-85 years. This sample was comprised of 55.9% females and 29.5% males. History of depression was assessed via self-reported data on the medical history questionnaire and coded as a binary variable (0 = no history, 1 = history present). Predictors were entered hierarchically. Block 1 included demographic covariates (age and sex). Block 2 included sleep health measures (Sleep Quality Index and sleep efficiency). Block 3 included cognitive performance measures (Dimensional Change Card Sort, Flanker task, and backwards digit span). Multiple imputation was used to address missing data. We used hierarchical logistic regression models to assess proposed associations; model fit was evaluated using chi-square tests and Nagelkerke R^2 .

Results: The demographic-only model (Block 1) significantly predicted depression ($\chi^2(1) = 61.894$, $p < 0.001$), with age as a significant negative predictor (OR = 0.91). Adding sleep variables (Block 2) significantly improved model fit ($\chi^2(2) = 48.256$, $p < 0.001$), increasing explained variance from 7.2% to 12.6%. Poorer subjective sleep quality (OR = 1.03) and lower sleep efficiency (OR = 0.96) were associated with greater odds of depression. Adding cognitive variables (Block 3) further improved model fit ($\chi^2(3) = 28.207$, $p < 0.001$), increasing explained variance to 15.6%. Better performance on the DCCS (OR = 1.86) and backward digit span (OR = 0.90) independently predicted lower odds of depression. Gender was significant only after cognitive variables were added, suggesting a potential suppression effect.

Conclusion: Findings support a multidimensional model of depression in which age, sleep quality, and cognitive control uniquely contribute to explaining observed depressive symptoms. Of note, sex also emerged as a significant predictor in the full model. Results indicate that sleep and cognitive functioning represent distinct vulnerability pathways, highlighting the importance of integrated assessment and intervention strategies targeting both domains.

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1088

PAIN AND SUBJECTIVE-EEG SLEEP DISCREPANCIES IN COMMUNITY-DWELLING OLDER ADULTS: THE MODERATING ROLE OF MCI AND DEPRESSION

Russell Calderon, Sofia Liu, Youngmin Cho, Junxin Li
Johns Hopkins University School of Nursing

Introduction: Subjective-objective sleep discrepancy (SOSD)—the mismatch between self-reported and objectively measured sleep—is common in community-dwelling older adults. Pain is also prevalent in this population and can impact sleep quality and sleep perception. In prior work, we found that pain, mild cognitive impairment (MCI), and depressive symptoms were each independently associated with SOSD. Since these conditions frequently co-occur in older adults, the present study examined whether MCI or depressive symptoms moderate the association between pain and SOSD.

Methods: Baseline data were analyzed from 160 community-dwelling older adults enrolled in three randomized clinical trials (NCT03959202; NCT05064007; NCT05935241). Sleep efficiency

was measured using an in-home EEG device (Sleep Profiler™) and corresponding sleep diaries over two nights. The SOSD index was calculated as (objective—subjective)/objective. Pain behavior and depressive symptoms were measured using the PROMIS Pain questionnaire and the Geriatric Depression Scale. Montreal Cognitive Assessment scores between 18–25 indicated MCI. Multiple linear regression examined the association between pain behavior and the SOSD index. Moderation was tested in two separate models, each including an interaction term (Pain*MCI or Pain*Depressive Symptoms), adjusting for age, sex, education, BMI, and chronic conditions.

Results: Participants were 70.4 ± 5.7 years old, 85.6% women, and 56.6% with MCI. On average, participants under-reported their sleep efficiency (SOSD index=0.65). In adjusted models, greater pain behavior was associated with a more negative SOSD index ($\beta = -0.026$, 95% CI: [-0.046, -0.006]), indicating over-reporting sleep efficiency relative to EEG. In moderation analyses, this tendency to over-report was diminished among participants with MCI ($\beta = 0.051$, 95% CI: [0.014, 0.089]). In a separate model, depressive symptoms similarly weakened this tendency ($\beta = 0.006$, 95% CI: [0.000, 0.012]).

Conclusion: Greater pain behavior is associated with over-reporting sleep efficiency compared to EEG measures, but the association is attenuated among older adults with MCI or depressive symptoms. Our findings suggest a complex interplay where pain may influence subjective sleep reporting most strongly in cognitively intact individuals or those without depression. Clinicians should consider the potential influence of pain, cognition, and mood collectively when interpreting self-reported sleep quality in older adults.

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1089

ROLES OF DEPRESSION, RAPID EYE MOVEMENT PERCENT, AND WEIGHT ON COGNITION IN OLDER ADULTS WITH OBSTRUCTIVE SLEEP APNEA: EARLIER DIAGNOSIS MAY HELP

Khoi Huynh¹, Mariana Perepitchka¹, Abraham Alrefai¹, Kevin Murphy¹, Udochi Okorie¹, Anne Hutchinson¹, Aaron Perlow¹, Madelyn Chen¹, Adam Hyde², Edwin Meresh²

¹Loyola University Chicago Stritch School of Medicine,

²Department of Psychiatry, Loyola University Medical Center

Introduction: Rapid-eye movement (REM) sleep (~20% of total sleep time in adults aged ≥ 65) plays an important role in memory consolidation. Patients with Mild Cognitive Impairment (MCI) have reduced REM sleep and increased REM latency. Although major depressive disorder (MDD) is also associated with MCI, few studies explore interactions between affective disorders, REM-sleep disorders, and neurocognitive deficits (NCDs). This study addresses said literature gap by sampling from adults ≥ 65 populations to characterize interactions between NCDs, depressive disorders (Dep), obstructive sleep apnea (OSA), and weight.

Methods: In a retrospective chart review, patients with OSA who received polysomnography (PSG) were identified using ICD-10 codes. Inclusion criteria were ≥ 65 , alive, and without history of cerebrovascular events. Primary outcome was NCD presence.

Results: N=70; NCD+=35. Female=41. No REM sleep=15. Mean age=75.0. Mean Weight=87.9 kg. Dep+=16. Taking psychotropic medications (PsyMeds+)=33. On univariable logistic regression, Dep+ shows strongest association with NCDs (OR 6.30 [1.78-29.90], $p=0.0083$), and weight is inversely associated with NCDs (OR per kg=0.97 [0.95-0.99], $p=0.0144$). Age at first PSG (OR per year=1.07 [1.00-1.16], Wilcoxon $p=0.051$) and REM% (OR=0.96 [0.91-1.01], Wilcoxon $p=0.106$) both approach significance. Age at Dep diagnosis and PsyMed+ are not significantly associated with NCDs. In multivariable models, depression remained the dominant NCD predictor, increasing probabilities from ~30–60% to ~75–90% across age and REM% strata; age and REM% exerted modest effects. After adjustments of REM% and depressive disorders, lower weight continued to trend toward higher NCD odds (OR per kg=0.97 [0.94–1.00], $p=0.054$).

Conclusion: Depression in general ≥ 65 populations has reported ORs between 1.2-2.5 for NCDs. While more data are necessary to narrow 95% CIs, our higher OR for depression in older patients with OSA suggests complex interactions between depression and REM% for NCD risks. Weight loss, a recognized depressive symptom, has also been linked to NCDs. Our results suggest lower weight could be predictive of NCDs independently of depression in patients with OSA. Earlier OSA diagnosis and CPAP treatment could potentially reduce risks for NCDs. Prospective studies are needed. Finally, even with OSA (potentially memory-impairing), our data do not support concerns that antidepressants independently contribute to memory loss.

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1090

IRRITABILITY AS A PROXIMAL MECHANISM LINKING DAILY SLEEP AND SUICIDAL THOUGHTS: AN INTENSIVE MONITORING STUDY WITH ADOLESCENTS

Jessica Hamilton¹, Jamilah Silver², Simone Boyd¹, Aijia Yao¹, Jas Sarna¹, Ryan Shintani³, Marcus Shipp¹, Peter Franzen⁴

¹Rutgers University, New Brunswick, ²University of North Carolina, Chapel Hill, ³Ridgewood High School, ⁴University of Pittsburgh, Department of Psychiatry

Introduction: Over 1 in 5 US high school students report seriously considering suicide in the past year alone, making it essential to identify who is acutely at risk and when youth are most at risk for thinking about suicide. Although insufficient sleep (poor sleep quality and short sleep duration) are well-documented risk factors for suicide, less research has focused on potential mechanisms linking sleep and suicidal thinking. Irritability, which is separately linked to both insufficient sleep and suicide, may be a potential mechanism. The current study leveraged an intensive, real-time monitoring design for two months to examine sleep (quality, duration) and irritability as modifiable risk factors for suicidal thoughts among adolescents.

Methods: A total of 128 adolescents (Mean Age =15.9 years; 60% girls; 45% White) completed two months of ecological momentary assessment (EMA), including morning sleep diaries, irritability (3x/day), and evening-reported suicidal ideation. A subset of adolescents (N=63) wore actiwatches to capture behavioral sleep metrics during the two-month period. Multilevel modeling was used to examine whether individual fluctuations in sleep (quality, duration) predicted next-day irritability and suicidal ideation.

Results: Findings indicate that youth who reported worse sleep quality ($t=-6.19$, $p<.001$) and actigraphic-derived shorter sleep duration than usual ($B=-2.34$, $p=.02$) experienced more next-day irritability. Heightened irritability was associated with a greater likelihood of suicidal ideation that day ($B=.56$, $p<.001$). There were no direct links between sleep quality or duration and next-day suicidal thinking.

Conclusion: Poorer- and shorter-than-usual sleep may heighten next-day irritability, which may subsequently affect suicidal thinking in youth. Irritability may be a potential mechanism linking sleep and suicidal thinking in adolescents. This study highlights the importance of evaluating modifiable risk factors, such as sleep, and identifying potential mechanisms using intensive monitoring designs to inform interventions and prevent adolescent suicide.

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1091

NEUROMODULATORY EFFECTS OF BRIGHT LIGHT ON THREAT AND REWARD NETWORK METABOLISM IN DEPRESSED ADULTS

Karoline Shellhause¹, Henry Chase¹, Melanie Wang¹, Lauren Keller¹, Gilles Vandewalle², Kathryn Roeklein¹, Adriane Soehner¹

¹University of Pittsburgh, ²Université de Liège

Introduction: Light Therapy (LT) is a promising non-pharmacological treatment for depression, however, the mechanisms supporting its therapeutic benefits remain unclear. Preclinical models indicate that light modulates mood through melanopsin-containing of retinal ganglion cells (mRGCs). mRGCs are maximally sensitive to blue light and minimally sensitive to red light, and directly convey light signals from the retina to brain structures involved in threat and reward processing. Using within-scanner light exposures, we examined the degree to which melanopsin-engaging blue (vs. red light and darkness) light modulated regional metabolism within brain regions supporting threat and reward processing in adults with depressive symptoms.

Methods: A total of 33 young adults (18-30yr, 24.94 $\pm$ 3.17yr; 20 Female) with elevated depressive symptoms (Patient Health Questionnaire-9 >5) completed 1 week of a stable sleep schedule followed by an MRI assessment and pupillometry assessment of melanopsin-driven light responsivity (post illumination pupil response). During the MRI protocol, participants underwent pseudo-continuous arterial spin labeling to assess cerebral blood flow (CBF) during dark, blue, and red light exposures lasting approx. 5 minutes; the order of red and blue light was counterbalanced. A mixed effects model evaluated CBF differences in threat (amygdala, insula, ventromedial prefrontal cortex [vmPFC]) and reward (ventral striatum[VS], medial prefrontal cortex[mPFC]) network regions of interest, adjusting for age, sex, and depression severity.

Results: Light condition impacted CBF in the VS ($F=5.32$, $p=0.008$), mPFC ($F=4.41$, $p=0.017$), vmPFC ($F=4.63$, $p=0.014$), and insula ($F=6.02$, $p=0.004$). Activation was greater in red light versus dark in the VS ($p=0.014$), mPFC ($p=0.020$), vmPFC ($p=0.017$), and insula ($p=0.004$). There were no significant differences between dark and blue light, or red and blue light, contrary to our predictions. Melanopsin responsivity moderated effects of blue vs red light on CBF ($F=5.29$, $p=0.03$), such that greater melanopsin responsivity

was associated with greater mPFC CBF under blue but not red light conditions ($b=38.7$, $p=0.05$).

Conclusion: Among individuals with elevated depressive symptoms, bright light exposure may modulate metabolism threat and reward-related brain regions implication in depression pathophysiology in complex ways. Sensitivity of the melanopsin system could play a role in the degree to which blue light modulates affective brain function.

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1092

IMPROVING INSOMNIA AND REDUCING SUICIDAL IDEATION: SEQUENCING BEHAVIORAL AND COGNITIVE COMPONENTS IN BRIEF COGNITIVE BEHAVIORAL THERAPY

Todd Bishop¹, Samantha Daruwala², Craig Bryan¹

¹VA Center of Excellence for Suicide Prevention, ²Department of Psychiatry and Behavioral Health, The Ohio State University

Introduction: Insomnia contributes to the development and course of suicidal thought and behavior and is a component in some suicide prevention programming. One such multicomponent intervention is Brief Cognitive Behavioral Therapy for Suicide Prevention (BCBT). BCBT is a 10-12 session suicide prevention intervention that incorporates a sleep module consisting of stimulus control and sleep hygiene into the behavioral elements of its protocol. Our team recently undertook a study to identify BCBT's most potent components and whether the sequencing of behavioral or cognitive facets of treatment impacted treatment outcomes.

Methods: Veterans with recent suicidal ideation (SI) or behavior ($N = 49$) were enrolled in a pilot study that utilized a randomized counterbalance design. All participants received BCBT and were randomized (balanced on sex and history of suicide attempts) to receive one of two sequences: Behavioral before Cognitive (Beh+Cog) or Cognitive before Behavioral (Cog+Beh). To maintain participant safety, in all instances of treatment, the first module consisted of suicide risk assessment, crisis response planning, and means safety counseling. Participants completed weekly assessments prior to each intervention session, collecting data on suicidal thought and behavior, insomnia severity, and depression.

Results: A piecewise regression was used to examine changes in insomnia, suicidal ideation, suicide cognitions, and depressive symptomatology across groups. The introduction of behavioral components first was associated with more rapid decreases in insomnia severity ($Est=-9.93$, $SE=6.09$, $p=.027$) and SI ($Est=11.55$, $SE=4.93$, $p=.018$) compared to the Cog+Beh group. Severity of depression and suicide cognitions were observed to significantly decrease for both groups in sessions 1-5, but between group differences were not observed.

Conclusion: Preliminary findings from this ongoing trial suggest that participants that who receive behavioral treatment components first (including stimulus control) report more rapid reductions in both insomnia severity and SI. Findings support a growing literature highlighting the importance of addressing insomnia as part of a broader suicide prevention strategy.

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1093

KNOW THYSELF: HOW MUCH DOES WHAT WE THINK ABOUT SLEEP MATTER? INTERVENTIONAL TARGETS FOR TREATING PERINATAL SLEEP CONCERNS

Sammy Dhalliwal¹, Philip Gehrman¹, Huynh-Nhu Le², Jennifer Keller³

¹University of Pennsylvania, ²The George Washington University,

³The George Washington University School of Medicine and Health Sciences

Introduction: Sleep disturbance affects 60-80% of postpartum women and increases risk for depression and anxiety but continues to be regarded as a "normal" experience the postpartum period. Maladaptive sleep-related cognitions—including dysfunctional beliefs and catastrophizing about sleep—predict insomnia severity and treatment outcomes in general populations. However, the extent to which normative expectations around perinatal sleep (attitudes and beliefs assessed at pregnancy) predict postpartum sleep quality and interact with postpartum mood remains unknown. Such information could inform preventive interventional targets.

Methods: 432 pregnant women (24 weeks gestation +/- 5 weeks) completed measures on their attitudes and beliefs on postpartum sleep, alongside their current sleep quality (Pittsburgh Sleep Quality Index), and affect (Edinburgh Postnatal Depression Scale; Generalized Anxiety Disorder 7-item scale). They repeated these assessments at postpartum week-6, 12, 24. Among these, 49 women also completed wrist actigraphy at 6-8 weeks postpartum.

Results: Seventy percent (301/432) of all pregnant women expected poor sleep in the postpartum as rated as anything above "sometimes" on a 5 point-Likert scale. Level of predicted sleep disruption during pregnancy predicted postpartum sleep concerns above and beyond parity, past history of sleep disorders, and past psychiatric history. Notably, in healthy, first-time pregnant women, those who predicted greater sleep disturbance had significantly more disrupted sleep by both actigraphy and self-report measures ($Beta = .42$, $p < .01$, $R^2 = .14$). Among those women who predicted the worst sleep quality, level of postpartum anxiety significantly modified the effect of predictions on poor sleep quality: in other words, the greater one's anxiety in the postpartum, the poorer their objective and subjective sleep quality, independent of antenatal anxiety levels.

Conclusion: Pregnancy-rated attitudes and beliefs about sleep may serve as a modifiable risk factor of postpartum sleep concerns. In the postpartum, treating underlying postpartum anxiety may also help with sleep quality. The relationship between postpartum anxiety and postpartum sleep disruption apart from insomnia merits further evaluation to elucidate common etiological pathways.

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1094

ADVANCING VETERANS' MENTAL HEALTH: MACHINE LEARNING PIPELINES FOR DETECTING MAJOR DEPRESSIVE EPISODES DURING POLYSOMNOGRAPHY

Massimiliano Grassi¹, Archie Defillo¹, Melissa Bruner¹, Diane Lee², Jennifer Martin³

¹Medibio Limited, ²VA Greater Los Angeles Healthcare System,

³VA Miami Healthcare System, Geriatric Research, Education and Clinical Center

Introduction: Depression and PTSD are widespread among veterans receiving care for sleep disorders in the U.S. Veterans Affairs system, yet routine screening for Current Major Depressive Episodes (cMDE) remains rare in sleep clinics despite this well-known comorbidity. In this study, we examined how two polysomnography-based machine learning screening pipelines matched clinician-determined cMDE diagnoses in a VA sleep disorders cohort, aiming to address a critical gap in mental health detection.

Methods: This preliminary analysis included 30 adults recruited at the VA Greater Los Angeles Healthcare System for suspected sleep disorders, with 27 subjects retained after excluding three for data quality issues. cMDE status was established using the Mini International Neuropsychiatric Interview as the reference standard. Two machine learning pipelines were evaluated: one combining six AASM-recommended EEG derivations with a single lead-II ECG, and the other using only the lead-II ECG. Both pipelines performed automated sleep staging and extracted autonomic features, including heart rate and heart rate variability. These physiological features, together with PHQ-9 items 1 and 2, served as inputs to a classifier for estimating cMDE status.

Results: The prevalence of cMDE was high at 59.3% (16/27). The EEG+ECG pipeline correctly classified 14 of 16 cMDE-positive subjects and 8 of 11 cMDE-negative subjects, resulting in a sensitivity of 87.5% and a specificity of 72.7%. The positive predictive value (PPV) was 82.4% and the negative predictive value (NPV) was 80.0%. The ECG-only pipeline correctly classified 15 of 16 cMDE-positive subjects and 7 of 11 cMDE-negative subjects, with a sensitivity of 93.8% and a specificity of 63.6%. PPV was 78.9% and NPV was 87.5%.

Conclusion: The exceptionally high prevalence of cMDE in this veteran sample underscores a critical gap in mental health screening within VA sleep clinics, where rates exceed both the general population and many non-VA sleep cohorts. Both polysomnography-based machine learning pipelines evaluated in this preliminary study demonstrated strong screening performance, highlighting the potential for physiology-driven depression screening to be integrated into routine polysomnography workflows and identify veterans who could benefit from timely mental health intervention.

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1095

DETECTING MAJOR DEPRESSIVE DISORDER FROM SLEEP EEG USING ARTIFICIAL INTELLIGENCE

Matt Sprague¹, Chris Fernandez¹, Yoav Nygate¹, Sam Rusk¹, Tom Vanasse¹, Jan Wodnicki¹, Nick Glattard¹, James Herdegen², Nathaniel Watson³

¹EnsoData Research, EnsoData, ²Rush University Medical Center,

³University of Washington School of Medicine, Department of Neurology

Introduction: Obstructive Sleep Apnea (OSA) and Depression have co-linear and self-reinforcing relationships in their incidence, severity, and impacts on mood and cognition. Comorbidity and underdiagnosis of each is common. OSA patients have a 17.6% prevalence of major depressive disorders (MDD), while MDD patients have a 18% prevalence of OSA. Sleep EEG demonstrates characteristic changes in MDD patients including: impaired sleep continuity (increased fragmentation, reduced sleep efficiency), REM sleep disinhibition manifested as elevated REM density and reduced REM latency (≤ 65 minutes), changes in NREM sleep including reduced slow-wave sleep ($\leq 8\%$) and lower delta sleep ratio (DSR) (< 1.1), and spectral differences including higher gamma power and elevated alpha asymmetry. These characteristics were shown predictive of MDD diagnosis and treatment response. In this study we sought to detect MDD from sleep EEG using a novel deep learning approach.

Methods: An AI model training and testing sample of N=10,000 retrospective diagnostic PSGs (26.2% MDD-positive, 73.8% MDD-negative) were collected utilizing stratified sampling with proportionate allocation across MDD diagnostic prevalence, OSA severity, Gender, Age, and comorbid sleep, psychological, and neurological disorders. An EEG-only input deep learning ensemble was pre-trained for sleep staging prior to MDD detection. A subset of N=3,500 PSGs were used for training, N=1,500 for hyperparameter tuning, and N=5,000 studies held-out for final model validation. A second out-of-distribution hold-out dataset of N=135 was collected from patients referred for MSLT (48% MDD-positive). Sensitivity, Specificity, and ROC-AUC were reported and compared to the Delta-Sleep Ratio as a comparative baseline.

Results: The AI model demonstrated moderate performance in the two independent held-out datasets, with an ROC-AUC of 0.729 (N=5,000) and 0.703 (N=135) respectively. In the N=5,000 PSG sample, the model demonstrated 65.5% Sensitivity at 70% specificity, 49.3% at 80%, and 31.8% at 90% respectively. In the second N=135 MSLT-referred sample, the model showed 56.7% sensitivity at 70% specificity, 46.7% at 80%, and 45% at 90% respectively. The AI approach substantially outperformed the Delta-Sleep Ratio baseline in sensitivity and specificity in both samples with an ROC-AUC of 0.521 (N=5,000) and 0.537 (N=135) respectively.

Conclusion: The Sleep EEG-based deep learning model showed moderate performance detecting MDD, and outperformed the Delta Sleep Ratio.

Support (if any):

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1096

ASSOCIATIONS BETWEEN PUPILLARY LIGHT RESPONSE AND CIRCADIAN RHYTHM ALTERATIONS IN PATIENTS WITH DEPRESSIVE DISORDER

Seong Jae Kim¹, Hong Ji Hui², Hye Jin Han³, Ji Won Park², Jihyeon Son², Jaehyo Jung⁴, Jung Hie Lee⁵

¹Department of Psychiatry, Chosun University College of Medicine, ²Department of Psychiatry, Chosun University Hospital, ³Chosun University Hospital, ⁴Department of Big Data and Artificial Intelligence, Eulji University, ⁵Department of Psychiatry, Gwanggyo Good Sleep Clinic

Introduction: Circadian rhythm disruption in depression is associated with neuroendocrine alterations, such as cortisol dysregulation, which increase a vulnerability to affective instability. Yet, how these rhythm abnormalities contribute to the autonomic dysregulation underlying affective symptoms remains unclear. Light-driven pupillary responses reflect both autonomic function and the photic sensitivity of circadian system, offering a window into rhythm-autonomic coupling. This study compared pupillary light responses between depressed patients and non-depressed individuals, and investigated how these responses relate to sleep and circadian rhythm patterns.

Methods: Participants were recruited from Chosun University Hospital. Depression was diagnosed by a psychiatrist according to DSM-5 criteria, and the Montgomery-Åsberg Depression Rating Scale (MADRS) was used to quantify symptom severity. Thirty-four eligible participants were enrolled and classified into either the depression group (DG; $n = 20$) or the non-depression group (NDG; $n = 14$). Actigraphy (CamNtech Ltd., UK; MotionWare 1.3) was worn for ≥ 7 days, from which sleep parameters and non-parametric rest-activity rhythm indices were derived. Pupillometry was performed using an infrared computerized pupillometer (PLR-3000, NeurOptics Inc., USA) under a standardized light-stimulus paradigm, yielding constriction velocity, redilation velocity, and 75% recovery time. Generalized linear models examined the effects of each sleep/rhythm variable, and their interaction (Group $\times$ Variable) on pupillary indices.

Results: The DG showed lower sleep efficiency ($p = .03$) and higher fragmentation index ($p = .02$) compared with the NDG. Pupillometry revealed reduced constriction velocity ($p \approx .04$), reduced 75% recovery ($p \approx .04$), and relatively higher redilation velocity ($p \approx .03$) in the DG. Significant Group $\times$ least-active period (L5) interactions were observed across all pupillary metrics ($p \approx .02-.04$). Within the DG, a delayed L5 was associated with reduced constriction velocity and 75% recovery, but increased redilation velocity.

Conclusion: Patients with depression exhibited altered pupillary reactivity to light, characterized by reduced constriction, accelerated redilation, and aberrant recovery, indicating autonomic instability. These patterns were significantly associated with a delayed inactive-rhythm phase (L5), suggesting that circadian phase delay may contribute to altered autonomic control of pupillary responses.

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1097

EFFECT OF LEMBOREXANT ON INDIVIDUAL DOMAINS OF THE HAMILTON DEPRESSION RATING SCALE IN PATIENTS WITH INSOMNIA DISORDER AND DEPRESSION

Yoshikazu Takaesu¹, Hiroyuki Muraoka², Masahiro Takeshima³, Masaki Kato⁴, Hirofumi Hirakawa⁵, Hikaru Hori⁶, Ken Inada⁷, Hitoshi Sakurai⁸, Motohiro Ozone⁹, Michinori Koebis¹⁰, Margaret Moline¹¹, Yoshiteru Takekita⁴

¹Graduate School of Medicine, University of the Ryukyus, ²Yutaka Clinic, ³Graduate School of Medicine, Akita University, ⁴Kansai Medical University, ⁵Faculty of Medicine, Oita University, ⁶Faculty of Medicine, Fukuoka University, ⁷School of Medicine, Kitasato University, ⁸Faculty of Medicine, Kyorin University, ⁹School of Medicine, Kurume University, ¹⁰Eisai Co., Ltd., ¹¹Eisai Inc.

Introduction: Insomnia and mood disorders are commonly comorbid. Many patients with partial remission of depression have insomnia symptoms remaining. In a recent study of lemborexant (LEM), a dual orexin-receptor antagonist approved for the treatment of insomnia, open-label LEM significantly improved symptoms of both insomnia and depression in a comorbid patient population. We report the symptoms on the Hamilton Depression Rating Scale (HAM-D-17) impacted by LEM.

Methods: This multicenter, prospective intervention study enrolled participants with insomnia disorder diagnosed with major depressive disorder (MDD) or bipolar disorder (BD) receiving stable antidepressant treatment. MDD add-on ($n=29$) and BD add-on ($n=15$) cohorts included participants with prior insomnia medication; MDD mono ($n=23$) and BD mono ($n=15$) cohorts included participants without concomitant hypnotic medication. LEM starting dose was 5 mg and could be titrated up/down. Mood disorder severity was measured with HAM-D-17 at baseline (BL) and Weeks 4/8/12. HAM-D-17 assesses severity of depression over the past week; higher scores indicate more severe depression, and 3 items (rating scale 0–2) evaluate insomnia symptoms (items 4–6; early, middle, and late insomnia, respectively). This analysis considered each item to determine those affected by LEM treatment.

Results: As previously reported, total HAM-D-17 scores for the 4 cohorts decreased significantly (improved) compared with BL at 4 weeks; these improvements were maintained over 12 weeks. This was also true when the 3 items associated with insomnia were excluded. At Week 12, significant decreases (improvements) in scores for HAM-D-17 items 1–8, 10, 11, and 13–15 were observed. However, the item scores most impacted by LEM treatment were the 3 insomnia items, as well as the overall depression item (rated on a scale from 0–4). The magnitude of change from BL was at least 0.4 points in the total patient population (early insomnia: BL 1.21, Week 4 -0.71 ; middle insomnia: BL 1.21, Week 4 -0.50 ; late insomnia: BL 0.91, Week 4 -0.53 ; depression: BL 1.56, Week 4 -0.44).

Conclusion: The majority of change (improvement) on the HAM-D-17 with LEM treatment was related to changes in sleep symptoms in this comorbid patient population.

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1098

PERCEIVED SOCIAL SUPPORT BUFFERS THE ASSOCIATION BETWEEN INSOMNIA SEVERITY AND DEPRESSIVE SYMPTOMS IN NIGHT-SHIFT WORKERS

Tiffany Xu¹, Elle Wernette¹, Marleigh Treger²,
Atena Gutierrez Chavez¹, Cameron McCray³, Christopher Drake¹,
Philip Cheng¹

¹Henry Ford Health System, ²Henry Ford Sleep Research, ³Henry Ford Sleep Research Center

Introduction: Insomnia and depression have a well-established bidirectional relationship, and both are highly prevalent in night shift workers. Yet, some with severe insomnia do not report high depressive symptoms, suggesting underlying resilience factors. One example is perceived social support; the subjective feeling that reliable help is available. Social support, a buffer against depressive symptoms, may be less accessible to night-shift workers due to inverted schedules. We assessed whether perceived social support moderated the relationship between insomnia severity and depression symptoms in night shift workers and hypothesized that higher social support would be protective.

Methods: Night shift workers (N = 63) completed the Insomnia Severity Index (ISI), Patient Health Questionnaire-9 (PHQ-9), Epworth Sleepiness Scale (ESS), and a single-item measure of perceived social support ("How often is social support available to you if you need it?") Social support responses were categorized into two groups: Low/Some Support versus High Support. We used a linear regression model to assess whether the interaction between ISI-D and social support (Low/Some vs High) predicted PHQ-9 scores, adjusting for age and gender.

Results: Higher insomnia severity predicted greater depressive symptoms ($\beta = 0.94$, $p < .001$). Perceived social support significantly moderated this association in both unadjusted models ($\beta = -0.47$, $p = .019$) and models controlling age and gender ($\beta = -0.46$, $p = .025$). Simple slopes indicated insomnia and depression were more strongly associated for those with Low/Some Support ($\beta = 0.94$, $p < .001$) than those with High Support ($\beta = 0.48$, $p < .001$).

Conclusion: Perceived social support buffered the depressive impact of insomnia severity in night shift workers, highlighting subjective feelings of social support as a meaningful resilience factor. These findings suggest that interventions targeting social support may be a promising avenue for improving mental health in shift-work populations. Future studies should determine whether perceived or objective support (e.g. quantity of social interaction) is most protective, and whether enhancing support can reduce depression risk in shift workers.

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1099

SLOW WAVE SLEEP RESPIRATORY RATE MODERATES RESPONSE TO MORNING BLUE LIGHT IN REDUCING SUICIDAL COGNITIONS

Alisa Huskey, Lana Elali, Devin Hermes, Gabriela Franca,
Shivani Desai, Sean Hogan, Michael Grandner, William Killgore
University of Arizona

Introduction: Respiratory rate and autonomic activity during sleep reflect sleep stage, with slow wave sleep being characterized by greater parasympathetic dominance and more rhythmic breathing. Both parasympathetic activity and respiratory rate have been linked with emotional state and emotion regulation. This study examined whether respiratory rate during slow wave sleep predicts changes in suicidal cognitions following morning blue light versus red placebo light.

Methods: Active-duty service members (N=37; ages 19-51; 21.6% women) with elevated depression completed a 6-week counter-balanced, crossover, placebo-controlled trial of active blue light (462nm) and red, or placebo light (661nm). Light was administered through AYO® eyewear for 30 minutes each morning over two 2-week periods with a 2-week washout. Participants wore a (Dreem3®) headband to assess sleep stage and respiratory rate. Respiratory rate during slow wave and REM sleep was examined a predictor of pre- to post-treatment change in suicidal cognition scores for both conditions (negative scores indicating improvement).

Results: Suicidal cognitions decreased more in the blue light condition than the placebo (blue M = -2.53, SD = 6.46; red M = -1.86, SD = 5.85; $p = 0.087$). Respiratory rates during sleep were also higher during blue light (blue M = 16.14, SD = 2.03; red M = 15.86, SD = 2.28; $p = 0.057$). Treatment condition moderated the influence of respiratory rate on suicidal cognition change. During blue light, higher respiratory rate during slow wave sleep predicted greater reductions in suicidal cognitions (Effect = -0.50, S.E. 0.25, $p = 0.047$); whereas, during placebo, higher respiratory rate predicted increases in suicidal cognitions (Effect = 0.34, S.E. 0.37, $p = 0.021$).

Conclusion: Respiratory rate during slow wave sleep is higher in the blue light condition and predicted larger decreases in suicidal cognitions across two weeks of morning exposure. In the placebo condition, however, higher respiratory rate during slow wave sleep predicted worsening suicidal cognitions. These findings suggest that early-morning blue light influences autonomic processes during deep sleep and may influence treatment response by supporting cognitive and emotion regulation pathways involved in reducing suicidal ideation.

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1100

DIGITAL CBT-I IS ASSOCIATED WITH MEANINGFUL, SUSTAINED REDUCTIONS IN DEPRESSION AND ANXIETY AMONG THOSE WITH CLINICALLY SIGNIFICANT BASELINE SYMPTOMS

Frances Thorndike¹, Charles Morin², Joseph Ojile³, Lee Ritterband⁴,
Robert Gerwien¹, Jason Ong¹, Aleena Sange¹, Samantha Edington¹,
Emerson Wickwire⁵, Heidi Riney¹

¹Nox Health, ²Université Laval, ³Clayton Sleep Institute, LLC,

⁴University of Virginia School of Medicine, ⁵University of Maryland School of Medicine

Introduction: Previous randomized controlled trials have found that Cognitive-Behavioral-Therapy for Insomnia (CBT-I) can have anti-depressant and anxiolytic effects for people with insomnia and comorbid depression/anxiety. However, it is unclear if these findings can generalize to real-world delivery of digital CBT-I. Moreover, it is unknown if these effects are sustainable in the real

world. The purpose of this study is to examine real-world evidence of the long-term impact of dCBT-I on mood and anxiety symptoms among individuals with insomnia and clinically significant depression/anxiety at baseline.

Methods: Data were derived from a large real-world analysis of dCBT-I (Somryst, DREAM trial). The validated PHQ-8 and GAD-7 questionnaires were collected at baseline, post-treatment, and for up to two years. Patients were stratified by baseline depression and anxiety severity (separately). All available endpoints were evaluated using a mixed-model repeated measures analysis with study visit as a fixed effect and subject as a random intercept.

Results: Patients with severe anxiety at baseline (mean GAD-7 score=17.5; SE=0.20) experienced large, clinically meaningful improvements in anxiety at post-treatment (mean score=10.6; SE=0.22; Cohen's $d=1.68$) and 2-year follow-up (mean=10.8; SE=0.82; $d=1.35$); $p < 0.0001$. Patients with severe depression at baseline (mean PHQ-8 score=21.6; SE=0.31) experienced similarly large improvements at post-treatment (mean=13.0; SE=0.33; $d=1.93$) and 2-year follow-up (mean=12.5; SE=1.43, $d=1.53$); $p < 0.0001$. Improvements were less pronounced for patients with mild anxiety (baseline mean GAD-7 score=6.8 [SE=0.18]; post-treatment mean=5.2 [SE=0.19]; $d=0.59$) and mild depression (baseline mean PHQ-8 score=7.1, SE=0.20; post-treatment mean=5.1, SE=0.21; $d=0.82$). Among patients with mild anxiety and depression at baseline, no statistically significant improvements were observed at two years.

Conclusion: dCBT-I improved depression and anxiety among individuals with comorbid insomnia and clinically significant depression and anxiety at baseline. The largest improvements were observed among individuals with severe depression and/or anxiety at baseline. Patients with mild depression and/or anxiety did not experience the same benefit.

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1101

ASSOCIATION OF DEPRESSION AND SUBJECTIVE-OBJECTIVE DISCREPANCY IN EXCESSIVE DAYTIME SLEEPINESS

Shruthi Kumar¹, Venkatesh Krishnamurthy², Sanjay Patel³

¹University of Pittsburgh Medical Center, ²University of Pittsburgh, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh

Introduction: Excessive daytime sleepiness (EDS) is common, affecting 10 to 25% of the general population. Comorbid depression may alter patient's perception and limit awareness of sleepiness and thereby lead to potentially poor clinical outcomes. This study aims to evaluate if depression is associated with subjective-objective discrepancy in EDS.

Methods: We reviewed medical records of patients who presented with excessive daytime sleepiness (EDS) and underwent an overnight polysomnogram (PSG) followed by a next-day Multiple Sleep Latency Test (MSLT) at three University of Pittsburgh Medical Center sleep laboratories, between March 2023 and December 2024. Subjective-objective discrepancy was defined as an Epworth Sleepiness Scale (ESS) score ≥ 10 with a mean sleep latency ≥ 8 minutes on the MSLT. Patients were classified as having

depression if it was documented in the sleep evaluation or if prescribed an antidepressant in the 6 months preceding MSLT.

Results: Among the first 151 patients (mean age 32.9 ± 11.5 years; 119 women [78%], 32 men [22%]; 88% White) who underwent PSG/MSLT, 70 (46%) had evidence of subjective-objective discrepancy. Depression was present in 67% of those with and 58% of those without discrepancy ($p=0.25$). No significant differences were observed between those with and without discrepancy in age (34.2 ± 12.9 vs. 31.8 ± 10.1 , $p=0.19$), gender (women: 79% vs. 79%, $p=0.9$), race (White: 90% vs. 86%, $p=0.36$), body mass index (28.1 ± 7.7 vs. 28.5 ± 6.7 , $p=0.75$), ESS score (14.8 ± 3.4 vs. 15.2 ± 3.2 , $p=0.5$), or average sleep duration (7.5 ± 1.5 vs. 7.7 ± 1.7 , $p=0.4$) on sleep diaries. In gender-stratified analyses, men with subjective-objective discrepancy had a higher prevalence of depression (80% vs. 47%, $p=0.05$) with a trend towards significance, but no difference was observed in women (64% vs. 61%, $p=0.76$). After adjusting for age and race, there was a trend towards depression being associated with subjective-objective discrepancy in men (OR = 4.7, 95% CI: 0.95-23.6, $p = 0.06$), but not women (OR = 1.2, 95% CI 0.58-2.6, $p=0.6$).

Conclusion: Depression may be associated with subjective-objective discrepancy in sleepiness among men. Therefore, male patients presenting with EDS should be evaluated for depression as part of their clinical assessment.

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1102

ASSOCIATION OF RAPID EYE MOVEMENT SLEEP, OXYGEN SATURATION, AHI SEVERITY, DEPRESSION, AND METABOLIC SYNDROME IN OSA: A RETROSPECTIVE ANALYSIS

Kevin Murphy¹, Udochi Okorie¹, Abraham Alrefai¹, Madelyn Chen¹, Khoi Huynh¹, Aaron Perlow¹, Anne Hutchinson¹, Mariana Perepichka¹, Adam Hyde², Edwin Meresh²

¹Loyola University Chicago Stritch School of Medicine,

²Department of Psychiatry, Loyola University Medical Center

Introduction: Obstructive Sleep Apnea (OSA) is associated with elevated rates of depression and metabolic syndrome, likely mediated by intermittent hypoxia and sleep fragmentation. Whether these outcomes differ based on respiratory events occurring during REM versus non-REM sleep remains uncertain. This study examines the relationship between REM-related oxygen saturation (SaO₂), AHI severity, depression, and metabolic abnormalities in adults with OSA.

Methods: A retrospective chart review was conducted on adults with OSA who underwent baseline polysomnography without CPAP therapy. Extracted variables included mean REM SaO₂, total AHI, depression diagnosis, and metabolic syndrome components (hypertension, type 2 diabetes, and hyperlipidemia). Patients who did not enter REM sleep were excluded from REM SaO₂ analyses but retained for descriptive comparison. Linear regression assessed the association between mean REM SaO₂ and total AHI. Independent t-tests compared mean REM SaO₂ across diagnoses of depression, hypertension, type 2 diabetes, and hyperlipidemia.

Results: Of 250 patients reviewed, 35 (14%) did not reach REM sleep. Among the 215 patients who achieved REM sleep, lower mean REM SaO₂ significantly predicted higher total AHI ($\beta = -3.18$; $p < 0.001$). Mean REM SaO₂ did not differ by depression ($p = 0.35$) or hyperlipidemia ($p = 0.19$) but was significantly lower

in patients with type 2 diabetes ($p < 0.01$) and hypertension ($p < 0.001$). Compared with REM-capable patients, those who failed to reach REM exhibited more severe OSA (mean AHI 40 vs 23) and higher rates of depression (40% vs 33%), hyperlipidemia (77% vs 40%), type 2 diabetes (37% vs 20%), and hypertension (71% vs 46%). **Conclusion:** Mean REM SaO₂ is strongly associated with AHI severity in patients with OSA. While REM SaO₂ was not associated with depression or hyperlipidemia, its significant relationship with hypertension and type 2 diabetes highlights possible links between REM-related desaturation and cardiometabolic burden. Individuals who failed to reach REM sleep had more severe OSA and a greater prevalence of all comorbidities. Prospective studies including larger proportions of patients with severe OSA are needed to further define these associations.

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1103

DEPRESSION AND ANXIETY AT THE US-MEXICO BORDER ASSOCIATED WITH SLEEP DURATION, SLEEP QUALITY, SLEEP TIMING, AND DAYTIME SLEEPINESS

Andrea Diaz-Pacheco¹, Elizabeth F. Rasmussen¹, Patricia Molina¹, John Ruiz¹, Orfeu Buxton², Sanjay Patel³, Girardin Jean-Louis⁴, Azizi Seixas⁴, Debbie Chung⁴, Carolina Scaramutti⁴, Sadia B. Ghani⁵, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²Penn State University, ³Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh, ⁴University of Miami, ⁵Southern Arizona Veterans Affairs Health Care System

Introduction: Little is known about associations between multi-dimensional sleep health and mental health in Hispanic/Latino populations.

Methods: Data were obtained from the Nogales Cardiometabolic Health and Sleep (NOCHES) study, consisting of 983 adults age 25-60 living at the US-Mexico border around Nogales, AZ. Depression (PHQ9) and anxiety (GAD7) symptoms were assessed using validated scales. Sleep metrics included actigraphy total sleep time (TST, $n=819$), self-reported TST, apnea-hypopnea index (AHI, assessed with home sleep test), snoring, daytime sleepiness, insomnia symptoms (ISI, total score and sub scores for sleep [e.g., difficulty falling/staying asleep], daytime [e.g., impaired functioning], and perception [e.g., dissatisfaction/worry] symptoms), perceived control over sleep (BRISC), sleep medication use, and sleep timing (weekday and weekend bedtime and waketime). Covariates included age, gender, language of administration, and acculturation (Mexican and Anglo).

Results: Self-reported TST was negatively associated with PHQ9 ($B=-0.28$, $p < 0.0005$) and GAD7 ($B=-0.15$, $p=0.003$) but actigraphy TST was not ($p>0.05$). ISI was associated with PHQ9 ($B=0.47$, $p < 0.0005$) and GAD7 ($B=0.34$, $p < 0.0005$), and when subscales were adjusted for each other, associations were seen for sleep (PHQ9 $B=0.48$, $p < 0.0005$; GAD7 $B=0.37$, $p < 0.0005$) and daytime (PHQ9 $B=0.67$, $p < 0.0005$; GAD7 $B=0.41$, $p < 0.0005$) but not perception symptoms. AHI was associated with PHQ9 ($B=0.03$, $p=0.017$) but not GAD7. Frequent snoring was associated with PHQ9 ($B=1.79$, $p < 0.0005$) and GAD7 ($B=1.32$, $p < 0.0005$), as was frequent daytime sleepiness (PHQ9 $B=7.05$, $p < 0.0005$; GAD7 $B=4.67$, $p < 0.0005$). Increased control over sleep was negatively associated with PHQ9 ($B=-1.15$, $p < 0.0005$) and GAD7 ($B=-0.75$,

$p < 0.0005$). Frequent sleep medication use was associated with PHQ9 ($B=3.60$, $p < 0.0005$) and GAD7 ($B=3.37$, $p < 0.0005$). Weekday bedtime was associated with PHQ9 ($B=0.11/\text{hr}$, $p=0.047$) and weekday waketime was associated with PHQ9 ($B=0.08/\text{hr}$, $p=0.019$; GAD7 $B=0.08/\text{hr}$, $p=0.006$).

Conclusion: Mood disorder symptoms at the US-Mexico border are associated with self-reported later weekday sleep timing and shorter self-reported (but not actigraphic) sleep duration, insomnia and sleep apnea symptoms, and decreased control over sleep. Sleep health interventions in this community may lead to improved mental health.

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1104

DISTRESS FROM UNUSUAL THOUGHT CONTENT MODERATES THE ASSOCIATION BETWEEN MANIC SYMPTOMS AND SLEEP DISTURBANCE

Laura Beaman, Jung won Cha, Michael Grandner, William Killgore
University of Arizona

Introduction: Sleep impairment is a hallmark feature of bipolar disorder and a marker of relapse risk, yet not all individuals with elevated mania symptoms exhibit impaired sleep. Psychosis-related distress may identify individuals who are more vulnerable to the sleep-disruption observed in mania. This study tested whether subjective distress from prodromal symptom subtypes moderates the relationship between manic symptoms and sleep in a non-clinical young adult sample.

Methods: Forty-two participants (ages 18–59; 54.8% female; seeking help for sleep) completed the Mood Disorder Questionnaire (MDQ), Sleep Condition Indicator (SCI), and the Prodromal Questionnaire (PQ-16), from which three previously proposed distress subscales were computed: Negative Symptoms (NSd), Unusual Thought Content/Paranoia (UTCd), and Perceptual Abnormalities/Hallucinations (PAD). All predictors were mean-centered. Three models were conducted predicting SCI total scores from MDQ scores, each including one distress subscale as the moderator, covarying for age and sex. Additional models tested whether mania symptoms or distress scores alone predicted SCI scores.

Results: A significant interaction emerged for the UTCd subscale indicating that higher MDQ scores predicted poorer sleep only among participants reporting elevated distress from unusual thoughts ($\beta = -0.43$, $p = .015$). When UTCd was low, manic symptoms were not associated with subjective sleep. In contrast, neither the NSd subscale ($p = .49$) nor the PAD subscale (trend-level; $p = .064$) significantly moderated the relationship. Critically, neither MDQ symptoms alone ($p = .99$) nor PQ distress scores alone ($p = .74$) predicted SCI scores in separate models, indicating that subjective sleep disruption emerged only when considering their interaction.

Conclusion: Subjective distress from unusual thought content (UTCd), rather than mania severity or prodromal symptoms alone, plays a critical role in determining when manic symptoms are linked to poor perceived sleep. This suggests that affective reactivity to unusual thoughts may initiate sleep deterioration during periods of emerging mania. Clinically, findings underscore the importance of assessing subjective distress levels, not just symptom presence, when monitoring individuals at risk for bipolar-spectrum conditions. Interventions that target distress tolerance,

cognitive appraisal of unusual thoughts, and coping responses may help prevent sleep disruption and support early intervention efforts.

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1105

EFFECTS OF DAILY MORNING BLUE LIGHT EXPOSURE ON SUBJECTIVE SLEEP QUALITY AND MENTAL HEALTH

William Killgore¹, Gabriela Franca¹, Lana Elali¹, Devin Hermes¹, Michael Grandner¹, Lindsey Hildebrand¹, Juan Gonzalez², Kathryn Kennedy¹, David Negelschach¹, Alisa Huskey¹

¹University of Arizona, ²USSOCOM

Introduction: Morning exposure to blue light typically phase advances the timing of sleep onset (i.e., one falls asleep earlier) while evening light exposure delays the onset of sleep. We have previously shown that blue light in the morning increases rapid eye movement (REM) sleep compared to placebo red light. Here, we further examined the effects of morning blue light on subjective sleep, depression, posttraumatic stress, and suicidal ideation in the same sample.

Methods: Thirty-six participants (27 male; age=33.8, SD=6.9 years), serving in the military and meeting criteria for mild depression underwent a 6-week counterbalanced, crossover, placebo-controlled clinical trial of blue (462 nm; active) versus red (661 nm; placebo) light using a set of light exposure glasses fitted with four LEDs at the appropriate wavelength. In a cross-over design, participants were exposed to light for 30-minutes each morning for two weeks. After a 2-week washout period, participants completed a subsequent 2-week trial with the alternate light. Participants completed the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), Beck Depression Inventory-II (BDI-II), Patient Health Questionnaire-9 (PHQ-9), and PTSD Symptom Checklist (PCL-5).

Results: Morning blue light (relative to placebo red) was associated with a significant reduction in sleep disturbance on the PSQI and insomnia severity on the ISI ($p < .05$). Blue light also reduced depression on the BDI-II, and PTSD severity on the PCL-5, as well as reduced suicidal ideation on the PHQ-9 and BDI-II ($p < .05$). Clinical significance was calculated using the Minimally Clinically Important Difference (MCID). Blue light significantly improved ($p < .05$) rates of depression classification on the PHQ-9 (27% blue vs. 10.8% placebo) but not BDI-II (40.5% vs. 27%).

Conclusion: Daily morning blue light produced meaningful improvements in sleep quality, insomnia, depression, PTSD symptoms, and suicidal ideation compared with placebo, including clinically significant reductions in PHQ-9 depression classification. These findings suggest that brief morning blue-wavelength exposure may serve as a simple, effective adjunctive treatment for mood and sleep disturbances. Given prior evidence of increased REM resulting from morning blue light, future work should examine its role in these benefits to sleep and mental health.

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1106

LONGITUDINAL ASSOCIATION BETWEEN CIRCADIAN DYSREGULATION AND MOOD SYMPTOMS IN YOUNG PEOPLE AT-RISK FOR MANIA

Lauren Keller¹, Margaret Kuzemchak², Meredith Wallace¹, Prachi Shah¹, Allison Caswell², Simey Chan¹, Brant Hasler³, Kathryn Roecklein¹, Peter Franzen³, Adriane Soehner¹

¹University of Pittsburgh, ²University of Pittsburgh Medical Center, ³University of Pittsburgh School of Medicine

Introduction: Identifying biological risk-markers for bipolar disorder (BD) remains challenging. Meta-analyses suggest individuals at-risk for BD exhibit significant variability in daily routines and irregular sleep patterns, potentially indicating circadian rhythm dysregulation. We investigated whether biological circadian measures predicted symptoms of mania over time in young people at clinical high-risk for BD.

Methods: In an ongoing study, 92 participants aged 16-24 ($M = 21.9$, $SD = 2.11$) were recruited across a spectrum of lifetime sub-threshold mania symptoms (Mood Spectrum Measure-Lifetime; MOODS-SR-L). At baseline, salivary dim-light melatonin onset (DLMO) assessed circadian phase on weekday (Thursday) and weekend (Sunday) nights; measures of circadian phase (average of weekday and weekend DLMO), phase instability (weekend-weekday DLMO difference) were derived. The post-illumination pupil response (PIPR) measured melanopsin-driven light responsiveness by comparing blue to red 200 ms light stimuli at 6sec (PIPR6) and 10–40sec (PIPR30) after stimulus onset. Mania (Altman Self-Rating Mania Scale; ASRM) and depressive (Patient Health Questionnaire-9; PHQ-9) symptoms were evaluated monthly over up to 3-years follow-up. As high and/or variable levels of manic symptoms over time are associated with BD risk, mixed effect models assessed average levels of mood symptoms over follow-up and generalized linear mixed effect models with a dispersion parameter examined mood symptom variation over follow-up. All models varied for age, sex, psychiatric medication use, family bipolar history, retinal irradiance, and photoperiod.

Results: Greater circadian phase instability was associated with higher average mania symptoms over follow-up ($\beta_{\text{instability}} = 0.50$, $p = 0.022$). Both greater circadian phase instability ($\beta_{\text{instability}} = 0.05$, $p < 0.001$) and higher melanopsin responsivity ($\beta_{\text{PIPR6}} = 2.38$, $p < 0.001$) were associated with more variability in mania symptoms over time. Additionally, later circadian phase ($\beta_{\text{phase}} = 0.05$, $p < 0.001$) and phase instability ($\beta_{\text{instability}} = 0.10$, $p < 0.001$) were associated with more variability in depression symptoms over time.

Conclusion: Our interim results indicate that elevated melanopsin responsivity may be a promising biological marker of mania risk, whereas later circadian phase specifically relates to worsening depression over time. Circadian phase instability predicted longitudinal mood lability more broadly. These data provide insight into potential mechanisms underpinning the mood stabilizing effects of social rhythms therapy and dark therapy for BD; future experimental or intervention studies should evaluate causal relationships.

Support (if any):

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1107

OBJECTIVE-SUBJECTIVE DISCREPANCY IN SLEEP ASSESSMENT IN OSA PATIENTS WITH A HISTORY OF DEPRESSION

Milana Fedorenko, Boris Dubrovsky, Jeremy Weingarten,
John Cunningham
New York-Presbyterian Brooklyn Methodist Hospital

Introduction: Depression is associated with sleep disturbance on both PSG and self-reported measures, such as PSQI. However, PSQI and PSG variables may relate differently to depression symptoms. Additionally, a discrepancy between objective and subjective sleep in depression was found to correlate with OSA severity. This study analyzes objective-subjective mismatch in patients with depression undergoing OSA evaluation.

Methods: From 2001 patients referred for diagnostic PSGs, 49 patients with depression (30 women, 33 Caucasian, $M[Age]=45.8\pm16.9$) were selected. Major medical and other psychiatric conditions were excluded. PSQI estimates of habitual total sleep time (TST), sleep latency (SL) and sleep efficiency (SE), and post-PSG estimates of in-lab TST, SL and WASO were used to calculate mismatch indices (MI) with respective PSG values ($MI=[\text{objective-subjective}]/\text{objective}$). Multiple regressions were used to predict each MI based on objective TST, SL, SE, N1%, N3%, REM%, REM latency, WASO, #awakenings, total arousal index (TAI), AHI, SpO₂nadir, and self-reported PSQI-Global, ISI, ESS, Center for Epidemiologic Studies Depression Scale-Revised (CESDR). Age, sex, BMI were used as covariates.

Results: Relative to PSG, PSQI estimates showed significant underestimation of TST ($p=0.028$) and SE ($p=0.008$), with greater underestimation of SE predicted by lower AHI ($p<0.001$) and, marginally, by higher PSQI-Global ($p=0.059$). MIs for PSQI-estimated TST and SL did not relate to any explanatory variables. Post-PSG estimates showed significant overestimation of WASO ($p<0.001$) and marginal underestimation of SL ($p=0.077$). In regressions of post-PSG MIs, overestimation of WASO was predicted by lower ESS ($p=0.039$) and, marginally, by lower CESDR ($p=0.054$); underestimation of TST was predicted by lower AHI ($p=0.038$); overestimation of SL was predicted by higher PSQI-Global ($p=0.003$) but lower ISI ($p=0.024$).

Conclusion: This sample of patients with depression evidenced disparities between objective and subjective sleep measures. Underestimation of SE on PSQI and underestimation of TST on post-PSG self-report were both predicted by lower AHI. Roles of depression symptoms and standardized sleep questionnaires in objective-subjective mismatch were inconsistent. Mechanisms linking lower AHI with perception of shorter/less efficient sleep in depression should be further explored.

Support (if any): none

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1108

OBJECTIVE-SUBJECTIVE DISCREPANCY IN SLEEP ASSESSMENT IN PATIENTS WITHOUT SIGNIFICANT HISTORY: ROLES OF INSOMNIA AND DEPRESSION SYMPTOMS

Joel St. Germain, Douglas Walker, Jeremy Weingarten,
Boris Dubrovsky, John Cunningham
New York-Presbyterian Brooklyn Methodist Hospital

Introduction: Disparities between objective and subjective sleep measures have been frequently reported in patients with depression and insomnia. Relatively few studies evaluated objective-subjective mismatch in people without medical or psychiatric conditions. This study analyzes the effect of mood and insomnia symptoms on sleep (mis)perception in patients without significant history who were referred for a diagnostic PSG and failed to meet OSA diagnosis.

Methods: A total of 191 patients without major medical or psychiatric diagnoses were selected from 2001 consecutive PSGs based on $AHI<5.0$ and $PLM\ index<25.0$ (102 women, 70 Caucasian, $M[Age]=42.3\pm15.2$). Using subjective post-PSG estimates of in-lab total sleep time (TST), sleep latency (SL) and time awake after sleep onset (WASO), objective-subjective mismatch indices ($MI=[\text{objective-subjective}]/\text{objective}$) were calculated. MIs were regressed on objective sleep variables (TST, SL, SE, N1%, N3%, REM%, REM latency, WASO, #awakenings, total arousal index, TAI) and ESS, ISI, Center for Epidemiologic Studies Depression Scale-Revised (CESDR) and ISI-by-CESDR interaction, with age, sex and BMI as covariates.

Results: In this sample, 139 (72.8%) patients had $ISI\geq8$ (suggestive of insomnia), and 66 (34.6%) had $CESDR\geq16$ (suggestive of depression). Above-threshold ISI and CESDR scores were significantly related ($\chi^2(1df)=22.8$, $p<0.001$). Greater overestimation of SL was significantly predicted by higher TAI ($p=0.048$), higher objective-SE ($p=0.043$), higher objective-WASO ($p<0.001$), higher CESDR ($p<0.001$) and ISI-by-CESDR interaction ($p=0.001$). In patients with $ISI<8$, CESDR predicted SL overestimation ($R\text{-square}=37.2\%$); with $ISI\geq8$, CESDR and SL-MI were unrelated ($R\text{-square}=0.5\%$). MIs for TST and WASO did not relate to any predictor variables.

Conclusion: In this sample of patients without significant medical or psychiatric history and without OSA, above-threshold insomnia and depression symptoms were strongly related. Overestimation of SL related to greater objective sleep disturbance on TAI and WASO, but, paradoxically, higher objective SE. Overestimation of SL strongly related to elevated depression symptoms among patients without ISI elevation, but not in patients with elevated ISI, suggesting the role of mood in sleep misperception in normal sleepers.

Support (if any): none

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1109

PERINATAL CHANGES IN SUBJECTIVE SLEEP AND THEIR ASSOCIATION WITH POSTPARTUM MOOD SYMPTOMS

Michele Okun, Jake Anderson, Leilani Feliciano
University of Colorado, Colorado Springs

Introduction: The perinatal period involves numerous physiological, psychological, and biological changes. Sleep is one of the most frequently reported concerns during this time. Many women report disturbances, impairments, and/or insufficient sleep beginning in early gestation which continues into the postpartum period. Poor sleep has been linked to several negative outcomes, including increased postpartum mood symptoms. This preliminary report examines changes in subjective sleep from late first trimester through three months postpartum and their association with postpartum depressive symptoms.

Methods: Forty-two pregnant women ($Mage = 30.8 \pm 5.1$), with and without a history of postpartum depression, participated in a longitudinal observational study at 16-20 weeks, 28-31 weeks, and ~3 months postpartum. Participants completed the PSQI, ISI, ESS, FFS, and the EPDS at each of the time points via Qualtrics. Repeated Measures ANOVA assessed changes over time and linear regression examined associations with depressive symptoms at 3 months postpartum.

Results: Fatigue showed a significant linear and quadratic change over time ($F = 21.5$, $p < .001$; $F = 34.8$, $P < .001$, respectively), increasing in late pregnancy and decreasing at three months postpartum. ISI scores also changed significantly in a linear and quadratic manner over time ($F = 4.8$, $P = .038$; $F = 9.37$, $P = .005$, respectively). Lastly, there was a significant quadratic change in depressive symptoms PP ($F = 5.14$, $p = .033$) with a modest increase at T2. Sleep quality and daytime sleepiness did not change over time, but not surprisingly, PSQI scores were elevated at each time point, averaging ~7. While there were several cross-sectional associations between the questionnaires and EPDS scores, only fatigue at T2 was associated with higher EPDS scores at 3 months PP ($F = 8.86$, $p = .006$).

Conclusion: Consistent with existing data, women with and without a history of depression report elevated levels of disturbed sleep during early pregnancy which all modestly improve by 3 months postpartum. Contrarily, sleep was minimally associated with mood symptoms at 3 months postpartum. Targeting sleep early in the gestational period with behavioral and educational interventions may mollify risk for mood symptoms across the perinatal period.

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1110

CHANGE IN SUBJECTIVE AND OBJECTIVE SLEEP MEASURES DURING COGNITIVE-BEHAVIORAL THERAPY AND LIGHT THERAPY FOR WINTER DEPRESSION

Katherine Ostrow¹, Peter Franzen², Kathryn Roeklein³, Greg Siegle⁴, Joan Skelly⁵, Kelly Rohan¹

¹University of Vermont, ²University of Pittsburgh School of Medicine, ³University of Pittsburgh, ⁴University of Pittsburgh, Department of Psychiatry, ⁵University of Vermont Larner College of Medicine

Introduction: Winter seasonal affective disorder (SAD) is characterized by a regular pattern of major depressive episodes that recur in fall/winter and spontaneously remit in spring/summer. Some SAD patients show circadian rhythm disturbances, with their circadian phase occurring later (phase delayed) or, less commonly, earlier (phase advanced) compared to healthy individuals in the winter. Sleep disturbances are common in SAD, including insomnia, hypersomnolence, sleep inertia, and abnormal sleep architecture. In this study, we compared pre- to post-treatment changes in subjective and objective sleep measures during a randomized clinical trial of group cognitive-behavioral therapy for SAD (CBT-SAD) vs. light therapy (LT). We expected larger improvements in sleep measures in LT than in CBT-SAD, given LT's assumed mechanism is correction of circadian phase.

Methods: Community adults aged 18+ years with Major Depression Recurrent with Seasonal Pattern (N=141) were randomized to six weeks of CBT-SAD (n=73) or LT (n=68). For one week at

pre- and post-treatment, participants wore the ActiGraph GT9X-BT and completed the Pittsburgh Sleep Diary daily. Linear mixed effects models were conducted on these actigraphy- and diary-derived variables: sleep efficiency (SE), total sleep time (TST), and midsleep.

Results: All Treatment $\times$ Time interactions were ns. Significant pre- to post-treatment time effects were found for higher diary-measured SE [$F(1, 117) = 18.485$, $p < .001$; 2.4% higher], longer TST as measured with diaries [$F(1, 123) = 5.840$, $p = .017$; 11.4 minutes longer] and shorter TST with actigraphy [$F(1, 109) = 8.604$, $p = .004$; 10.6 minutes shorter], and earlier actigraphy-measured midsleep [$F(1, 110) = 10.214$, $p = .002$; 12.2 minutes earlier].

Conclusion: Participants perceived that their sleep continuity (SE) improved over treatment, whereas actigraphy found no meaningful pre- to post-treatment difference. Participants perceived longer sleep duration at post- compared to pre-treatment, whereas actigraphy revealed the opposite pattern. It is possible that participants perceived better sleep because they generally felt better following treatment. Actigraphy-measured sleep timing (midsleep) advanced over both treatments.

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1111

SLEEP DURATION MODERATES THE ASSOCIATION BETWEEN THE ORAL MICROBIOME AND DEPRESSIVE SYMPTOMS AMONG EMERGING ADULTS IN THE UNITED STATES

Marie-Rachelle Narcisse¹, David Barker¹, Tsute Chen², Kiara Medeiros³, Mary Carskadon¹

¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²Forsyth Institute, ³E.P. Bradley Hospital Sleep Research Laboratory

Introduction: Emerging research has increasingly linked the microbiome-gut-brain axis to the pathophysiology of mental health disorders such as depression. Sleep has been linked to both depression and the oral microbiome (OM). Given these interconnections, it is plausible sleep health moderates the association between depressive symptoms and OM diversity. This study, therefore, examines whether sleep health (e.g., duration, quality, disorders) moderates the association between depressive symptom severity and OM diversity. This approach enables a nuanced understanding of how such behavioral health factors as sleep might condition the association between depression and biological systems like the OM.

Methods: Data were derived from the National Health and Nutrition Examination Survey (2011-2012), focusing on emerging adults (ages 18-26 years) who completed the Patient Health Questionnaire (PHQ-9). We categorized self-reported sleep duration as very short, short, healthy, or long, following AASM guidelines. Participants indicated whether they had received diagnoses of sleep disorders or reported trouble sleeping. OM richness [observed operational taxonomic units (OTUs) at the genus level; Faith's Phylogenetic Diversity (FPD)] or richness and evenness [Shannon-Wiener diversity (SWD); inverse Simpson index (ISI)] were characterized using several alpha diversity indices. We used Generalized Linear Models to examine interactions between PHQ-9 depression scores (range:0-27) and sleep health variables in relation to microbial diversity.

Results: Among the 1,168 participants (mean age: 22 years), 51% were females. Moderation analysis revealed interactions between PHQ-9 scores and sleep duration categories for SWD ($F_{3,15} = 11.77$; $p < 0.001$; OTU ($F_{3,15} = 4.94$; $p = 0.027$; and ISI ($F_{3,15} = 3.88$; $p = 0.031$). Among participants reporting very short or short sleep durations, higher PHQ-9 scores were associated with lower OM richness and evenness. Specifically, insufficient sleep appears to exacerbate the negative link between depressive symptoms and microbial diversity, while adequate sleep may buffer against this association. Reported sleep disorders and troubles sleeping did not moderate the associations.

Conclusion: Among emerging adults, the direction and strength of the association between depressive symptoms and oral microbiome diversity depend on sleep duration. These findings are consistent with studies suggesting the OM may be influenced by sleep health. Future research needs to investigate the potential role of circadian rhythms in these associations.

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1112

PSYCHOSOCIAL AND NEIGHBORHOOD CORRELATES OF SLEEP-RELATED IMPAIRMENT AMONG BLACK ADULTS

Velarie Ansu¹, Michelle Thompson², Zihao Wang³, Clarence Earl Locklear³, Nina L'Houtellier³, Judite Blanc³, Azizi Seixas¹, Joon Chung³, Girardin Jean-Louis¹

¹University of Miami, ²Lehigh University, ³University of Miami Miller School of Medicine

Introduction: Daytime sleep-related impairment (SRI) may represent a pathway through which psychosocial and neighborhood conditions influence cardiometabolic risk. Black adults experience disproportionately greater exposure than non-White adults, likely due to unique structural stressors. However, the factors associated with daytime impairment and its relevance to cardiometabolic health remain unclear. This study aimed to identify the psychosocial and environmental correlates of SRI in a large community sample of Black adults.

Methods: We analyzed cross-sectional data from 480 Black adults (67% female; mean age 42.0 ± 12.7 years) residing in Miami and New York City enrolled in the NIH-funded 'ESSENTIAL' study. SRI was assessed with the PROMIS® SRI scale. Psychosocial variables included social support, everyday discrimination, perceived stressors, depression/anxiety history, and the SF-12 Mental Component Summary (MCS-12). Environmental determinants included Assessment of Sleep Environment (ASE), Neighborhood Environment Walkability Scale-Abbreviated (NEWS-A) indices, and an address-linked to neighborhood noise score. We used linear regression models to identify correlates of SRI. Mediation analyses estimated the indirect effects of determinants (MCS-12, ASE, NEWS-A residential density, NEWS-A crime, noise, NEWS-A aesthetics), adjusting for sociodemographic covariates (age, sex, education, employment, marital status, religion, household income) and study site.

Results: In unadjusted models, greater social support was associated with lower SRI ($\beta = -0.9$ to -0.7 , $p < 0.01-0.001$), whereas higher everyday discrimination was associated with greater impairment ($\beta = 0.16$, $p < 0.001$). A history of depression or anxiety was associated with worse impairment ($\beta = 5.4$, $p < 0.001$). Lower MCS-12 scores ($\beta = -0.46$, $p < 0.001$) were associated with

greater SRI scores. Greater perceived stressors were associated with greater impairment ($\beta = 1.42$, $p < 0.001$). In the fully adjusted model, MCS-12 ($\beta = -0.43$, $p < 0.001$), ASE ($\beta = 0.13$, $p < 0.001$), residential density ($\beta = 0.009$, $p < 0.001$), and neighborhood noise ($\beta = 0.20$, $p < 0.05$) independently predicted higher SRI. Neighborhood crime and aesthetics were not significant ($p \geq 0.05$).

Conclusion: Findings showed SRI was strongly associated with poorer mental health and adverse neighborhood conditions particularly residential density, sleep environment disruption, and noise. Additional analyses are needed to confirm how these findings are generalizable across different US populations.

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1113

PROSPECTIVE ASSOCIATIONS BETWEEN SCHOOL NIGHT SLEEP, PRE-WEEKEND REWARD FUNCTION, AND WEEKEND ALCOHOL USE IN HIGH SCHOOL STUDENTS

Brant Hasler¹, Allysa Quick², Nina Oryshkewych², Meredith Wallace², Greg Siegle³, Daniel Buysse², Duncan Clark¹

¹University of Pittsburgh School of Medicine, ²University of Pittsburgh, ³University of Pittsburgh, Department of Psychiatry

Introduction: Sleep and circadian factors longitudinally predict alcohol use during adolescence and adulthood, but the underlying mechanisms remain unclear. Furthermore, extant studies have largely focused on timeframes of months-to-years; studying more proximal sleep/circadian-alcohol associations may better inform prevention/intervention efforts. To address these gaps, we assessed objective sleep/circadian characteristics in high school drinkers, examining the proximal associations with one putative mechanism (reward function) and alcohol use across the school week and weekend.

Methods: One hundred and fourteen high school students reporting prior alcohol use completed an 8-day protocol during the school year that included both naturalistic and laboratory methods. Sleep was assessed throughout via actigraphy; circadian phase was assessed during an overnight laboratory visit on Thursday via the salivary dim light melatonin onset (DLMO). Self-report (positive affect; alcohol craving) and behavioral [Balloon Analogue Risk Task (BART)] measures of reward function were administered Friday in the lab. Self-reported alcohol use was assessed from Friday through Sunday. We hypothesized that later circadian phase (DLMO), greater circadian misalignment (shorter DLMO-midsleep intervals), and shorter total sleep time (TST) on weekdays would predict altered pre-weekend (Friday) reward function, and that the sleep/circadian variables and altered pre-weekend reward function would predict greater weekend alcohol use.

Results: Only 24% of participants endorsed alcohol use on the study weekend. Weekday DLMO and DLMO-midsleep were unrelated to pre-weekend reward function or weekend alcohol use. Moreover, weekday TST did not predict positive affect, alcohol craving, or weekend alcohol use. Shorter weekday TST did predict greater reward-related risk taking based on the BART (greater explosions; $B = -0.23$; $p = 0.017$). Furthermore, greater explosions (BART) predicted a higher likelihood of weekend alcohol use ($OR = 1.19$; $p = 0.004$).

Conclusion: Findings did not support hypothesized associations between circadian markers and proximal reward function or

alcohol use, although the latter association may have been limited by relatively low alcohol use on the study weekend. Findings were consistent with insufficient schoolnight sleep amplifying reward-related risk taking, which in turn was associated with a higher likelihood of weekend alcohol use. This suggests a path by which insufficient sleep impacts alcohol use in adolescents; experimental studies will be required to determine causality.

Support (if any): R01AA025626 (Hasler)

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1114

PREDICTING POST-TRAUMA INSOMNIA AND NIGHTMARE SEVERITY TWO WEEKS AFTER INTERPERSONAL VIOLENCE

Lily Jankowiak¹, Anthony Reff², Cameron McCray¹, Kanica Bhutoria³, David Moore², Jennifer Peltzer-Jones², Christopher Drake²

¹Henry Ford Sleep Research Center, ²Henry Ford Health System,

³Eastern Michigan University

Introduction: The Hospital Mental Health Risk Screen (HMHRS) predicts risk for negative outcomes following acute trauma, including posttraumatic stress disorder (PTSD). Insomnia and nightmares are common reactions to acute trauma and are considered modifiable risk factors for the development of PTSD. The HMHRS may be useful for detecting risk for post-trauma insomnia and nightmares, however, no studies have tested if the HMHRS predicts sleep disturbances within the acute aftermath of trauma. We tested the hypothesis that the HMHRS would predict (1) more severe insomnia and nightmares immediately after trauma, and (2) worsening of insomnia and nightmares from pre- to post-trauma.

Methods: We recruited 29 patients discharged from the emergency department (ED) at an urban Level I trauma center following interpersonal violence exposure (Mage = 37.3 ± SD 14.2, 65.5% female, 75.9% Black or African American, 44.8% ≤ \$20,000, 65.5% physical assault). Patients completed the HMHRS within 72 hours of violence exposure, as well as the Insomnia Severity Index (ISI) and Nightmare Disorder Index (NDI) to retrospectively report their pre-trauma insomnia and nightmare severity. Patients completed the ISI and NDI again two weeks later (Mdays = 13) to report their post-trauma insomnia and nightmare severity. We performed linear regression modeling HMHRS sum scores as a predictor of: (1) post-trauma ISI and NDI sum scores, adjusting for pre-trauma ISI and NDI, and (2) change in ISI and NDI scores from pre- to post-trauma.

Results: The HMHRS prospectively predicted post-trauma ISI ($\beta = 0.36$, $p = .002$, $R^2 = 0.26$) and NDI scores ($\beta = 0.22$, $p = .005$, $R^2 = 0.31$) above and beyond pre-trauma scores. The HMHRS did not predict change in pre- to post-trauma ISI ($\beta = 0.28$, $p = .167$) or NDI scores ($\beta = 0.04$, $p = .762$).

Conclusion: These preliminary data suggest the HMHRS predicts post-trauma insomnia and nightmare severity within the acute aftermath of interpersonal violence. Patients presenting to the ED with elevated HMHRS scores following interpersonal violence may potentially be suitable for insomnia- and nightmare-focused treatments during the acute recovery period to prophylactically reduce risk of posttraumatic psychopathology, including PTSD.

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1115

BEDTIME PROCRASTINATION, NEGATIVE AFFECT, AND EMOTION REGULATION

Rebecca Campbell¹, Nishka Gupta¹, Mika Hirata², Rebekah Monroe¹, Lindsey Chou¹, Ellen Leen-Feldner³

¹Bowling Green State University, ²Bowling Green State University/Henry Ford Health, ³University of Arkansas

Introduction: Bedtime procrastination, delaying going to bed despite ample opportunity (Kroese et al., 2014), can have negative consequences (Hill et al., 2025). Little is known about what drives bedtime procrastination, though emotion regulation has been identified as a possible mechanism. Possibly, bedtime procrastination is a result of the inability to regulate negative emotions effectively. However, strategy-specific investigations are limited. We aimed to understand if the link between negative affectivity and bedtime procrastination was moderated by difficulty using adaptive strategies, and overuse of maladaptive strategies.

Methods: Participants were 108 undergraduate students (Mage = 19.2, SD = 1.43) that were primarily White (N = 93) women (N = 57). They completed a Qualtrics survey that included the 1) Positive and Negative Affect Scale (PANAS) as a measure of negative affect, 2) State-Difficulties in Emotion Regulation Scale (SDERS) to measure underuse of adaptive strategies, 3) Cognitive Behavioral Avoidance Scale (CBAS) as a measure of overuse of avoidance, and 4) Bedtime Procrastination Scale.

Results: Across two a priori moderation models, negative affect significantly predicted greater bedtime procrastination (SDERS model: $\beta = 0.32$, $p = .017$; CBAS model: $\beta = 0.21$, $p = .028$), whereas SDERS, CBAS, and both interaction terms were nonsignificant. Because the CBAS model approached significance, and it assesses multiple forms of avoidance that may differentially relate to bedtime procrastination, we conducted exploratory regression analyses of its four subscales (moderating effects were not evaluated here). After Holm correction, the Cognitive Social ($\beta = 0.362$, $p = .005$), Behavioral Nonsocial ($\beta = 0.304$, $p = .009$), and Cognitive Nonsocial ($\beta = 0.355$, $p = .036$) subscales were each significantly associated with bedtime procrastination. The Behavioral Social subscale was not significant ($\beta = 0.215$, $p = .099$).

Conclusion: Negative affect predicted bedtime procrastination. However, emotion regulation did not moderate this relation as hypothesized. Exploratory analyses implied specific types of avoidance matter, Cognitive and Behavioral Nonsocial avoidance, plus Cognitive Social avoidance. This suggests bedtime procrastination may function as an extension of avoidance rather than a failed adaptive regulation. The study is limited by the cross-sectional design and homogenous sample.

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1116

VALIDATING AN AUTOMATED ECG-BASED SLEEP STAGING AGAINST EXPERT SCORING IN A VETERAN POPULATION WITH SUSPECTED SLEEP DISORDERS

Massimiliano Grassi¹, Archie Defillo¹, Melissa Bruner¹, Diane Lee², Jennifer Martin³

¹Medibio Limited, ²VA Greater Los Angeles Healthcare System, ³VA Miami Healthcare System, Geriatric Research, Education and Clinical Center

Introduction: AI-based ECG-only sleep staging could be essential for diagnosing sleep disorders and expanding access to automated phenotyping. This would enable versatile analysis of polysomnography recordings, including applications in cardiometabolic and mental health. Cardiorespiratory coupling suggests that sleep stages can be inferred through autonomic changes. This study assesses the consistency between an automated AI-based ECG-based sleep staging algorithm and manual scoring by sleep technicians in a clinical population.

Methods: We analyzed data from the first 30 participants enrolled at the VA Greater Los Angeles Healthcare System for evaluation of suspected sleep disorders. The ECG-based algorithm generated 30-second epoch classifications for Wake, N1, N2, N3, and REM using lead-II ECG features. Human scoring performed by clinical sleep technicians served as the reference standard. Agreement between automated and manual scoring was evaluated using overall percent agreement (OPA) and Cohen's kappa. For each sleep stage, we additionally calculated positive percent agreement (PPA), negative percent agreement (NPA), and positive predictive value (PPV). To obtain point estimates and 95% confidence intervals, we applied a bootstrap procedure with 10,000 resamples at the EDF-file level, computing all metrics (OPA, Cohen's kappa, PPA, NPA, and PPV) using this resampling framework.

Results: A total of 24,949 epochs were analyzed. The OPA between the ECG-based algorithm and human scorers was 77.13% (95% CI: 73.81%-79.95%), with a Cohen's kappa of 0.67 (95% CI: 0.62-0.71), indicating substantial agreement. Stage-specific results for ECG-based staging showed high PPA for Wake (91.00%), N2 (83.49%), and REM (81.40%), moderate PPA for N3 (51.39%), and low PPA for N1 (27.13%). NPA values were high across stages, and PPV was strongest for Wake and REM.

Conclusion: The automated AI-based ECG staging demonstrated robust agreement with traditional manual EEG scoring, particularly for accurately identifying Wake, N2, and REM sleep. While N3 detection requires further refinement, these results highlight the strong potential of ECG as a simple, scalable, and standalone tool for assessing sleep architecture in clinical settings.

Support (if any): Medibio Limited.

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1117

SLEEP AND PSYCHOSIS-SPECTRUM EXPERIENCES IN ADOLESCENCE

Elizabeth Thompson¹, Grace Kupka², Aashritha Sadu², Emily Olenik³, Jared Saletin¹

¹Psychiatry and Human Behavior, Alpert Medical School of Brown University, ²E.P. Bradley Hospital Sleep Research Laboratory, ³Bradley Hospital

Introduction: Sleep difficulties coincide with psychosis-spectrum (PS) symptoms among individuals at clinical high risk for psychosis (CHR) and those experiencing their first episode of psychosis (FEP). Limited research has demonstrated time-linked associations between sleep and PS symptoms in adolescents at CHR or with FEP. The present study explored the associations between PS symptoms and sleep behaviors among psychiatrically acute adolescents.

Methods: Psychiatrically hospitalized adolescents (n=1164; 14.95±1.75 years; 64.9% female) reported on 1) PS symptoms (PRIME Screen- Revised), 2) sleep quality (PROMIS sleep disturbance and sleep-related impairment scales), 3) depression, anxiety, and psychological stress (PROMIS scales). A subsample completed a clinician-rated PS assessment followed by 2 weeks of objective sleep monitoring (wearable Actigraph on dominant triceps; scored via Sadeh) and twice-daily diaries of sleep and PS symptoms. Linear regressions and correlations explored associations among PS symptoms and sleep characteristics, including self-reported sleep quality and actigraphy-derived sleep parameters (i.e. total sleep time/duration [TST], sleep efficiency [SE], time awake after sleep onset [WASO], and the sleep regularity index [SRI]).

Results: In the inpatient sample, greater PS symptoms were significantly associated with worse sleep disturbances (beta=.12, t=4.16, p<.001) and, separately, greater sleep impairment (beta=.12, t=4.05, p<.001), beyond the significant effects of stress, depressive symptoms, anxiety, and sex. In the actigraphy sample, more diary-reported hallucinations were significantly correlated with shorter TST (r=-.62, p=.013) and less SE (r=-.52, p=.045), but not with WASO or SRI (p's > .05). Paranoia reports were not significantly associated with any of the actigraphy-derived sleep parameters (p's > .05). Greater clinician-rated positive symptom totals were associated with decreased sleep regularity (r=-.54, p=.032). Associations between clinician-rated symptoms and other sleep parameters were non-significant.

Conclusion: These findings indicate that PS symptoms are uniquely associated with sleep quality, beyond the effects of concurrent mental health symptoms. Discussion will include elaboration on associations between specific PS symptoms and sleep parameters, and implications of time-linked patterns observed. Further research exploring time-varying associations between PS symptoms and actigraphy-derived sleep behaviors, like those found in this study, will help elucidate underlying mechanisms linking these phenomena and inform the development of sleep-based interventions for these youth.

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1118

THE IMPACT OF LIVE FIRE TRAINING ON INFANTRY MEMBERS' SELF-REPORTED SLEEP AND STRESS

Dorion Liston¹, Quinn Kennedy¹, Mollie McGuire², Allison Brager³, Neda Bahrani¹

¹neuroFit, ²Naval Postgraduate School, ³United States Military Academy

Introduction: Poor sleep is both a predictor of decreased operational performance and a consequence of military operational environments and schedules. We sought to understand the effect of one type of military environmental exposure, blast overpressure, on Soldiers' sleep quality. As part of a larger study, we conducted a 2 (control / live fire) x 2 (pre / post) within-person design in which 25th Infantry volunteers completed sleep and stress ratings immediately before and after two training events. The control training event consisted of a three-day preparatory exercise with similar operational stresses to the subsequent live-firing event. For both events, the participants were exposed to periods of extended wakefulness, moving and positioning 777

howitzers, and intense physical activity. The live fire training event involved exposure of between 2 – 20 2L charges from 777 howitzers.

Methods: Twenty-one Cannon Crewmembers from the 25th Infantry Division Artillery 3rd Battalion completed the pre-control data session (three female, mean age 23.86 years, mean YOS 2.88 years). Nineteen participants (2 female, mean age 23.2 years, mean YOS 3.05 years) completed both the pre-live fire and post-live fire data sessions and 16 completed all four sessions. Self-reported 5-point Likert scale ratings of sleep and stress and a blast exposure survey were collected at each session.

Results: Participants reported consistent ratings of suboptimal sleep in the control event (pre-mean = 3.06 (1.04); post-mean = 3.29(1.31)), but significantly worsened sleep from pre-live fire to post-live fire (mean difference = 0.82, SE = 0.27 $t(18.1) = 3.04$, $p = 0.034$). Similarly, they reported stable levels of modest stress for the control event (pre-mean = 2.48 (1.30); post-mean = 2.72(1.07) but a nonsignificant trend towards increased stress from pre-live fire to post live fire (mean difference = 0.41, SE = 0.21), $t(17.8) = 2.05$, $p = .21$). Blast exposure survey data was not analyzed due to within-person inconsistency.

Conclusion: Results suggest that physiological and psychological stress from blast exposure is multi-dimensional and that sleep/wake dynamics may serve as a predictive tool for greater monitoring and mitigation of blast exposure.

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1119

'I CAN'T GET NO SATISFACTION': ANXIETY SYMPTOMS MEDIATE THE IMPACT OF ROMANTIC RELATIONSHIPS ON UNDERGRADUATES' SLEEP QUALITY

Kassidy Donald, Jack Peltz

State University of New York at Brockport

Introduction: With 43% of college students obtaining less than the recommended 7-9 hours of sleep per night and with over 75% reporting feeling tired/sleepy most days of the week (American College Health Association, 2023), this population is at significant risk for mental health problems (Gaultney, 2010). However, examinations of undergraduate sleep and mental health frequently overlook social factors, like the impact of romantic relationships. As research suggests that relationship stress impairs sleep (Madsen et al., 2023), the current study sought to examine the prospective impact of undergraduates' romantic relationship satisfaction on their mental well-being and sleep quality.

Methods: The current sample of undergraduates in romantic relationships (N=136, 77.0% female, Mlength=1.7 years) had a mean age of 19.9 years (SD=1.9). Approximately 65.7% of participants were white, with 20.0% Asian/Pacific Islander, 5.1% Hispanic/Latinx, 2.1% Black, and 7.2% multi-racial/ "other." At baseline, participants reported on relationship satisfaction (CSI-4). To prospectively assess both levels of general anxiety (GAD-2) and sleep quality ("How well did you sleep last night?"), students reported on these constructs across the subsequent week via a daily diary.

Results: To more accurately examine the indirect effects of undergraduates' romantic satisfaction on their sleep quality, we

controlled for the impact of participant sex, age, pre-bedtime screen usage, and sleep duration. Our results demonstrated that anxiety symptoms mediated the link between students' romantic relationship satisfaction and sleep quality (effect=.101; 95% CI[.0113, 2.00]. Specifically, lower levels of romantic satisfaction significantly predicted higher average levels of anxiety symptoms ($\beta=-.32$, $p<.01$), and, higher anxiety symptoms, in turn, predicted lower mean levels of sleep quality ($\beta=-.31$, $p<.01$).

Conclusion: Our results highlight the potential impact of undergraduates' romantic relationships on their well-being and sleep quality. Given the significant links amongst these constructs, understanding dissatisfaction in undergraduates' romantic relationships offers critical opportunities to enhance both their mental and sleep health.

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1120

CBT FOR INSOMNIA ADAPTED TO ADDRESS ALCOHOL USE IN COMMUNITY DWELLING ADULTS WITH CO-OCCURRING INSOMNIA AND HAZARDOUS ALCOHOL USE

Wilfred Pigeon¹, Todd Bishop¹, J. Todd Arnedt², Zoe Duberstein³, Jolynn Jones¹, Kenneth Conner¹

¹University of Rochester Medical Center, ²Michigan Medicine, University of Michigan, ³University of Rochester

Introduction: Insomnia is frequently comorbid with alcohol misuse. Cognitive behavioral therapy for insomnia (CBTi) improves insomnia in adults treated for alcohol use disorder but has seldom been modified to address alcohol use or tested in less severe, non-clinical samples with hazardous alcohol use (HAU). A two-phase study was designed to assess feasibility, acceptability and effect of CBTi modified to address insomnia and co-occurring HAU (CBTi-HAU) in an open label trial and a subsequent pilot randomized clinical trial (RCT).

Methods: The open label trial (N=10) enrolled community-dwelling adults with Chronic Insomnia Disorder and HAU. Following intervention refinements, the RCT (Target N=60) randomized similar participants to CBTi-HAU or Control (CTRL). Interventions were delivered over telehealth in 4 weekly individual sessions supplemented by a patient workbook. CBTi-HAU consisted of standard CBTi components adapted to include several alcohol reduction strategies with daily sleep/alcohol diaries. CTRL included sleep education, alcohol education and alcohol reduction strategies with 1-week of diaries prior to session 1 only. Measures: Insomnia Severity Index (ISI); the Short Inventory of Problems [for alcohol]-Revised (SIP-R); and percent days abstinent (PDA), percent heavy drinking days (PHDD) and drinks per drinking day (DDD) extracted from a 30-day Timeline Followback (TLFB) interview. Pre-post assessments occurred in the open trial with the addition of 12 and 24-week follow-ups in the RCT. For the open label trial, we evaluated pre-post differences with paired t-tests. Final RCT results will be available to present.

Results: All 10 open label participants completed treatment with 9 completing post-treatment assessments. Therapist feedback supported feasibility. Patient feedback was largely positive and supported acceptability. A pre-post reduction of 10.7 ISI points

was observed ($p < 0.001$; 95% CI, 8.5-12.8). Reductions in SIP-R ($p=.05$) and PHDD ($p=.04$), but not PDA ($p=.33$) or DDD ($p=.52$), were also observed. In the RCT, 47 participants (mean ISI = 17.1+/-3.0; 47.3+/-8.8 years old, 57% female, 15% minority) were randomized through Nov 2025 with 96% retention to date. Final results will be presented.

Conclusion: CBTi-HAU is a promising intervention for improving insomnia with mixed findings for alcohol use and its behavioral consequences.

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1121

CORRELATION BETWEEN INSOMNIA SEVERITY AND SUICIDAL RISK IN HOSPITALIZED PSYCHIATRIC PATIENTS

Paloma Cortés-Estrada, José Gerardo Garza-Marichalar, Beatriz Eugenia Chávez-Luévanos, Andrés Marcelo Treviño-Álvarez, Mayela Edith Mascorro-Herrera, Rodrigo Huereca-Lucio, Erasmo Saucedo-Urbe, Rosa Elisa Reyes-Salas
Hospital Universitario "Dr. José Eleuterio González"

Introduction: Suicide is a critical public health challenge, as it is considered one of the leading causes of death worldwide. Recent research has revealed a close association between sleep disorders and suicidal risk. Insomnia has been associated with an elevated risk of developing mental disorders, especially depressive syndromes. Nevertheless, uncertainty persists regarding whether insomnia operates as an independent phenomenon that may modify the likelihood of suicidal behavior. In this context, the investigation of insomnia within psychiatric settings is proposed using actigraphy, a non-invasive method for the objective assessment of sleep quality and a potentially valuable complementary tool in the field of sleep medicine.

Methods: Analytical cross-sectional study conducted in hospitalized psychiatric patients presenting suicidal risk at the "Dr. José Eleuterio González" University Hospital. The study employed actigraphy recording and a one-week sleep diary, along with the initial administration of validated scales assessing sleep quality, depressive symptoms, and suicidal risk.

Results: A total of 20 patients with suicidal risk were included in the study (75% female and 25% masculine; mean age 27.6 ±10.6 years). Mean psychometric scores were as follows: Columbia-Suicide Severity Rating Scale (C-SSRS) high risk, Insomnia Severity Index (ISI) 18.8, Beck Depression Inventory-II (BDI-II) 35, and Pittsburgh Sleep Quality Index (PSQI) 14.7. Actigraphic assessment showed a mean sleep efficiency of 76.9%, with an average sleep latency of 10.3 minutes and mean total sleep time of 349.8 minutes. The shortest total sleep duration recorded was 238.8 minutes.

Conclusion: The combination of short sleep latency with objectively insufficient total sleep time suggests that rapid sleep onset may mask clinically relevant sleep impairment in patients at suicidal risk. These findings underscore the relevance of incorporating objective sleep assessment in psychiatric settings to better identify sleep-related factors potentially associated with suicidal behavior.

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1122

CREATINE FOR PRESERVING COGNITIVE PERFORMANCE DURING SLEEP LOSS: CURRENT STATE OF THE RESEARCH

Ian Robertson¹, Tina Burke², Connie Thomas²

¹Walter Reed National Military Medical Center, ²Walter Reed Army Institute of Research

Introduction: Sleep loss impairs overall health and cognitive performance, including memory, attention, and executive function that is important for decision-making and risk assessment. In many high-demand occupations such as prolonged shift work, first responders, or military deployment, adequate sleep is often unattainable. The consequences of sleep loss in these professions are still high-stakes and are associated with accidents, workplace injuries, absenteeism, and long-term medical and psychiatric comorbidities. This highlights the need for simple, immediate treatment approaches to mitigate these effects, particularly when behavioral strategies that may take more time and effort are unfeasible. Our systematic review examines the current evidence on the use of creatine, an established ergogenic aid for strength performance and recovery, as a potential means of supporting cognitive function during periods of sleep loss.

Methods: We performed a systematic review to identify double blind, placebo-controlled studies in English assessing the effects of creatine supplementation on cognitive performance during sleep loss in healthy participants. The studies included in this review were identified through a search of PubMed, Web of Science, and PsycInfo. Two reviewers independently screened studies and resolved discrepancies by consensus.

Results: Of the 169 studies reviewed, only five met the inclusion criteria, which required a randomized controlled design, at least one cognitive performance outcome, and healthy participants experiencing some degree of sleep loss. In the included trials, participants underwent 3- 35 hours of sleep loss and received either a single creatine dose adjusted for body weight or a 7-day loading protocol. Cognitive performance outcomes varied across studies, but all reported modest improvements associated with creatine supplementation.

Conclusion: Collectively, these findings suggest that creatine may offer modest cognitive benefits during sleep loss, with the most consistent effects appearing at longer durations of sleep loss. However, confidence in these conclusions is limited due to small sample sizes, differing dosing protocols, wide variation in amount of sleep loss, and the diverse cognitive performance tasks used across studies. The limited number of studies that address the impact of creatine on cognitive performance highlight the need for additional studies in this area, especially in light of favorable outcomes.

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1123

DAILY ALCOHOL USE MODERATES THE ASSOCIATION BETWEEN POOR SLEEP QUALITY AND SUICIDAL IDEATION SEVERITY

Regan Virnoche¹, Matthew Gratton², Garrett Baber², Anna Quesada², Nancy Hamilton²

¹Baylor College of Medicine, ²University of Kansas

Introduction: Alcohol dependence is a known risk factor for suicidal ideation and is associated with reduced sleep quality. Poor sleep quality is also associated with suicidal ideation and related behaviors. Despite this, the relationship between alcohol use, sleep quality, and suicidality remains underexplored. To address this gap in the literature, we examined whether daily alcohol use moderates the relationship between poor sleep quality and suicidal ideation severity.

Methods: Participants (N = 971) from the National Sleep Research Resource's Assessing Nocturnal Sleep/Wake Effects on Risk of Suicide (ANSWERS) dataset answered a battery of questionnaires, including the Columbia Suicide Severity Rating Scale (C-SSRS), Pittsburgh Sleep Quality Index (PSQI), and a substance use survey. Bayesian ordinal regression was conducted in R to estimate the association between poor sleep quality and suicidal ideation severity in the past three months while controlling for age. Daily alcohol use was included as an interaction term. Posterior distributions were summarized using median odds ratios and 95% credible intervals.

Results: Poorer sleep quality was associated with greater past-three-month suicidal ideation severity (OR = 1.18, 95% CI [1.13, 1.24], $p = 100\%$). Daily alcohol use moderated this association: for individuals who drank daily, the relationship between poor sleep and suicidal ideation severity was stronger (interaction OR = 1.51, 95% CI [1.14, 2.11], $p = 99.85\%$). The main effect of daily drinking alone was highly uncertain (OR = 1.15, 95% CI [0.17, 7.72]).

Conclusion: In this sample, individuals with poorer sleep quality exhibited higher suicidal ideation severity in the past three months, and this association was amplified among those who consumed alcohol daily. These findings highlight the potential exacerbating effect of alcohol use on suicidality for populations with sleep difficulties. Future research should examine the influence of additional factors, such as minority status, gender, and other substance use. This research suggests the importance of targeted interventions for individuals who struggle with both sleep problems and excessive alcohol consumption.

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1124

ENHANCING SCREENING FOR OBSTRUCTIVE SLEEP APNEA IN PATIENTS WITH POST TRAUMATIC STRESS DISORDER: A QUALITY IMPROVEMENT INITIATIVE

Nolan Carlile¹, Zahari Tchopcev², Ryan Matheson¹, Jaclyn Faulk¹, Alexandra Ables¹, Amanda Radtke¹, W. Chris Frey², Alexander Purring², Holland Thomas², Caley Kropp², Matthew Brock²
¹San Antonio Uniformed Services Health Education Consortium, ²Wilford Hall Ambulatory Surgical Center

Introduction: The bidirectional relationship between Obstructive Sleep Apnea (OSA) and Post Traumatic Stress Disorder (PTSD) is well documented. Untreated OSA can reduce patient response to evidence-based PTSD therapies. Evidence supports screening PTSD patients for OSA but this is not routinely performed at our institution. This Quality Improvement (QI) project sought to increase the referral rate of patients with PTSD from behavioral health (BH) to sleep medicine for OSA evaluation.

Methods: Retrospective review of referrals received by our academic sleep disorders center in July 2025 was conducted to

establish baseline rate of referrals from BH for suspected OSA in patients with PTSD. For the initial intervention we reviewed literature linking these two disorders during a combined conference with BH providers. For the subsequent intervention we provided the STOP-Bang screening tool to the BH clinic for use in group therapy for patients with sleep complaints and ad-hoc use with patients diagnosed with PTSD. Additionally, we clarified the referral process. The primary outcome measure compared rate of referrals from the target clinic in 3-week intervals following each intervention cycle.

Results: During the baseline assessment period, BH referred 1 patient (female, active-duty) for OSA evaluation and she had PTSD. After the initial intervention we received 7 (n=2 female, 7 active-duty, 0 with PTSD) referrals from BH requesting OSA evaluation, a 600% increase from baseline. Following the second intervention we received 9 (n=3 female, 8 active-duty, 1 with PTSD) referrals, a 28.6% increase in referral from the first intervention. The number of PTSD patients referred remained unchanged.

Conclusion: Though a bi-directional link between PTSD and OSA is well established, there is a gap in the clinical appreciation of this relationship. We demonstrated during this ongoing QI project that simple interventions aimed at collaborating with BH can influence referral patterns. Our interventions reinforced use of the STOP-Bang screening tool and promoted referrals to our clinic from BH. Additional work is needed to ensure patients with PTSD are adequately screened and referred. Future planned interventions include flagging charts of patients with PTSD for screening and creating autotext in the electronic medical record to automate the referral process.

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1125

EVENINGNESS IS ASSOCIATED WITH INTERPERSONAL VIOLENCE EXPOSURE AND FUTURE DEPRESSION, SUICIDAL IDEATION, AND PTSD AMONG ACUTE TRAUMA PATIENTS

Anthony Reffi¹, Philip Cheng¹, Melissa Knauert², David Moore¹, Christopher Drake¹

¹Henry Ford Health System, ²Yale University School of Medicine

Introduction: Eveningness, a circadian preference for later sleep-wake timing, may increase exposure to traumatic events that disproportionately occur at nighttime, namely assaults. Further, eveningness is associated with a host of negative outcomes that may hinder post-trauma recovery. The current study investigated the correlates of eveningness in acutely traumatized patients, a population at risk for myriad posttraumatic outcomes. We recruited patients hospitalized following traumatic injury and hypothesized that, relative to morningness, eveningness would be associated with (1) greater likelihood of being hospitalized following interpersonal violence exposure, and (2) future depression, suicidal ideation (SI), and posttraumatic stress disorder (PTSD).

Methods: We recruited 88 patients hospitalized in a Level I trauma center in Detroit, MI within one week following traumatic injury (Mage = 39.53 ± 14.31, 67.0% male, 67.0% Black). Electronic medical records were reviewed to code the mechanism of injury by interpersonal violence (assault with a weapon, physical assault, sexual assault) and non-interpersonal trauma (motor vehicle collisions, falls). Participants responded to a single item

during hospitalization to identify as evening types (“Definitely an ‘evening’ type” / Rather more an ‘evening’ type”) or morning types (“Definitely a ‘morning’ type” / Rather more a ‘morning’ type”). Patients then reported their depression symptoms, SI, and PTSD symptoms approximately one-month post-trauma.

Results: The rates of interpersonal violence exposure significantly differed by morningness-eveningness ($\chi^2 = 6.07$, $p = 0.014$). Specifically, 58.8% of patients with an evening preference were hospitalized following interpersonal violence compared to 31.1% of patients with a morning preference (Relative Risk = 1.89). Eveningness was prospectively associated with increased odds of posttraumatic sequelae one-month post-trauma: depression (OR = 4.13, $p = .026$), SI (OR = 8.57, $p = .008$), and PTSD (OR = 5.40, $p = .019$), above and beyond baseline symptoms and time.

Conclusion: Patients with an evening preference had nearly twice the risk of being hospitalized for interpersonal violence exposure, perhaps because they are more likely to be out at night when violent crime peaks. The prospective links between eveningness and posttraumatic sequelae may be due in part to neurophysiological consequences of nocturnal wakefulness, such as elevations in negative affect, emotion dysregulation, and behavioral disinhibition.

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1126

INCREASED RISK OF SLEEP DISORDERS AMONG INDIVIDUALS WITH SUBSTANCE USE DISORDERS: A LARGE-SCALE EHR-BASED ANALYSIS

Rushikesh Pande, Alexandra Filipkowski, Priyanka Mehta, Ariana Shaari
Rutgers New Jersey Medical School

Introduction: Substance use is a growing public health concern with important implications for sleep health. However, the extent to which substance use-related disorders are associated with the subsequent development of sleep disorders remains insufficiently characterized. This study aimed to evaluate that relationship using a large multicenter electronic health record (EHR) dataset.

Methods: This retrospective multicenter cohort study utilized a de-identified EHR database spanning 20 years from 64 U.S. healthcare organizations. Adults with and without documented substance use-related disorders who had outpatient encounters and no prior sleep disorder diagnoses were included. Propensity score matching was performed 1:1 for demographics, comorbidities, and commonly used substances such as tobacco. Relative risks (RRs) were calculated for the development of any sleep disorder and specific subtypes, including insomnia, hypersomnia, circadian rhythm sleep disorders, and narcolepsy or cataplexy. Analyses were stratified by age (< 60 vs ≥ 60 years).

Results: The substance use-related disorder cohort included 580,004 individuals, while the comparison group included 4,825,877 individuals. Following propensity score matching ($n = 403,891$ per group), individuals with substance use-related disorders demonstrated a significantly higher risk of developing any sleep disorder (RR 1.29; 95% CI, 1.27–1.32). Subtype analyses showed that these individuals were more likely to develop insomnia (RR 1.14; 95% CI, 1.07–1.22), hypersomnia (RR 1.14; 95% CI, 1.07–1.22), circadian rhythm sleep disorders (RR 1.23; 95% CI, 1.02–1.49), and narcolepsy or cataplexy (RR 1.46; 95% CI,

1.05–2.02). These associations remained consistent across both age strata.

Conclusion: In this large EHR-based cohort, substance use-related disorders were associated with a significantly increased risk of developing sleep disorders across multiple diagnostic categories. These findings underscore the importance of recognizing sleep health vulnerabilities in this population and highlight the need for prospective studies to explore underlying mechanisms and dose-response relationships.

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1127

NICOTINE USE AND SUBJECTIVE SLEEP QUALITY AMONG INDIVIDUALS WITH TRAUMATIC BRAIN INJURY

Eleanor Steffens¹, Eunyeong Joo², Lauren McEachin², Jim Stone², Heather Altier³, Hannah Maybrier¹, Michael Smith³, Luis Buenaver³
¹Johns Hopkins University School of Medicine, ²Johns Hopkins School of Medicine, ³Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine

Introduction: Combustible cigarettes are the leading cause of preventable death in the U.S. Nicotine use prevalence has remained stable among those with chronic health conditions (CHCs) despite national reductions in the general population. This is particularly concerning because many individuals with CHCs, including those with a history of traumatic brain injuries (TBIs), are at greater risk for nicotine and tobacco-related diseases and complications (e.g., cancer, cardiovascular injury). Further, both TBI and nicotine use increase risk for insomnia symptoms. However, despite higher prevalences of nicotine use in populations with CHCs, to our knowledge no work has explored the association of nicotine status and subjective sleep quality in individuals with TBI and insomnia.

Methods: We analyzed baseline data from a community sample of TBI patients with insomnia ($N=48$, $\text{Mean}=39.8 \pm 12.9$, 65% female) enrolled in a parent RCT comparing 4-session CBT-I to sleep education. Participants self-reported combustible tobacco and e-cigarette usage, with 15% ($N=7$) endorsing current use and 17% ($N=8$) endorsing former use. A one-way ANOVA with Tukey’s HSD post-hoc analyses examined associations between nicotine use status and subjective sleep quality as measured by the Pittsburgh Sleep Quality Index (PSQI).

Results: Subjective sleep quality differed significantly by nicotine use status in individuals with TBI ($p=0.012$), such that current nicotine use was associated with significantly worse sleep quality compared to former nicotine use (MPSQI: 14.7 vs. 9.9; $p=0.009$). Though there was no significant difference in overall sleep quality scores between current and never nicotine users (MPSQI: 14.7 vs. 12.5, $p=0.2$), a greater proportion of current nicotine users reported “moderate-to-extreme difficulties” in sleep quality (100%), sleep latency (100%), and sleep disturbance (86%) than never nicotine users (78%, 88%, and 48%, respectively).

Conclusion: Individuals with a history of TBI and comorbid insomnia symptoms who currently use nicotine products may report worse sleep quality than former nicotine users. Findings underscore the need for targeted screening and policy efforts to reduce nicotine exposure and increase access to cessation treatments. Nicotine cessation may improve sleep quality among individuals with TBI.

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1128

PREVALENCE OF PHYSIOLOGIC OBSTRUCTIVE SLEEP APNEA RISK PHENOTYPES AND SLEEP DURATIONS AMONG ADULTS WITH GAMBLING DISORDER: A CLINICAL COHORT ANALYSIS

Elaine Cheung¹, Timothy Fong², Fiona Donovan², Elizabeth Hall²¹UC Irvine, ²UCLA

Introduction: Gambling disorder (GD) is associated with poor sleep and increased cardiometabolic risk. However, the prevalence and physiologic risk profile of obstructive sleep apnea (OSA) in GD remains unknown. Classic OSA risk factors—male sex, obesity, hypertension, and older age—may influence sleep health in this population. This study examined OSA-risk factors and sleep duration in adults seeking treatment for GD.

Methods: Demographic variables and clinical data were collected at intake from 736 adults receiving state-funded GD treatment in California. Variables included: age, sex, BMI, hypertension, and GD severity measured using the NORC Diagnostic Screen for Gambling Disorders (NODS). Self-reported habitual sleep duration (hours/night) was obtained at 30-, 90-, or 365-days after intake. Four physiologic OSA-risk markers—male sex, obesity (BMI ≥ 30 kg/m²), hypertension, and age >50 years—were summed to create a 0–4 OSA-risk burden score. Group differences were analyzed using ANOVA and t-tests. Associations between sleep duration, OSA-risk count, and GD severity were assessed using Spearman correlations. Sixteen physiologic phenotypes were evaluated for sleep-duration differences.

Results: OSA-risk burden distribution: 0 factors (7.1%), 1 factor (44.7%), 2 factors (36.4%), 3 factors (11.4%), and 4 factors (0.4%). Male sex, obesity, hypertension, and age >50 years increased monotonically across OSA-risk levels (all $p < 0.001$). Severe GD prevalence did not differ by OSA-risk burden ($p = 0.87$). Mean reported sleep duration was similar across OSA-risk groups (7.3, 7.2, 6.9, 7.0, 7.0 hours; $p = 0.349$), GD severity categories (7.2–7.0 hours; $p = 0.50$), and sex (7.09 vs 7.13 hours; $p = 0.58$). Sleep duration showed a weak inverse association with OSA-risk count ($\rho = -0.10$, $p = 0.0047$) and no association with GD severity ($\rho = -0.04$, $p = 0.34$). Three phenotypes demonstrated short sleep: • Male + hypertension + age >50 (non-obese): 4.7 h (N=3) • Male + obesity + hypertension (≤ 50): 6.00 h (N=10) • Female + obesity + age >50 : 6.64 h (N=58)

Conclusion: Nearly half of adults with GD exhibited ≥ 2 physiologic OSA-risk factors. Overall sleep duration did not vary by GD severity or OSA-risk burden, but specific physiologic phenotypes demonstrated reduced sleep, indicating phenotype-level heterogeneity in sleep vulnerability.

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1129

SIGMA OF OPIOID ADDICTION, "A NARCOLEPTIC PATIENT BLAMED TO BE EXCESSIVELY SLEEPY DUE TO HER OPIOID USE DISORDER"

Usman Riaz

Montefiore

Introduction: Healthcare professionals' stigmatising beliefs can lead to the provision of suboptimal care, a form of enacted stigma

that reduces patients' engagement with drug treatment. Among people with OUDs, internalized stigma has been associated with psychological distress and poorer quality of life continued substance use, and reduced engagement with substance use treatment and in all aspects of patient care. Stigma even undermines the health of people with OUDs in ways that have nothing to do with the treatment of OUDs.

Methods: Literature review, Case report

Results: Illicit drug use disorders are the most stigmatised health conditions worldwide, and stigma acts as a meaningful barrier to treatment entry and treatment provision. Illegal drug use disorders, as compared to other mental or physical health problems, are more likely to be viewed as a personal choice or a sign of weakness or "bad character". Stigma from health-care providers can manifest as lower empathy and engagement, non-collaborative and paternalistic approaches, suboptimal or disrupted care, and exclusion from services. Some reports believe that OAT is beyond their scope of practice and does not belong in primary care, which can clearly affect patients' care in all aspects of their mental and physical health along with addiction issues. Stigma also creates barriers for people with opioid use disorder in the criminal justice system, with widespread misconceptions regarding the purpose and benefits of treatment leading to programs that are often unavailable or poorly implemented.

Conclusion: The change at the level of policy and systems is needed to ensure that people with opioid use disorder are treated in all aspects of medical and mental health care with the same dignity and respect as any other patient group for optimal treatment outcomes. Removing regulatory barriers to prescribing OAT, for example, may help normalise treatment within primary care and allow opioid disorder to be managed like other chronic conditions. In addition to improving access, this provides opportunities to manage comorbid mental and physical health problems that may otherwise be left unaddressed.

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1130

SLEEP ASSOCIATED WITH CORE FEATURES OF PSYCHOPATHOLOGY IN SERIOUS MENTAL ILLNESS

Elizabeth Klingaman, Bridget Shovestul, Clayton Brown, Lan Li

Department of Veterans Affairs

Introduction: Among people with serious mental illness (SMI; schizophrenia and other psychotic disorders or bipolar disorder), insomnia is strongly associated with functional difficulties including worsening mood states, mania, delusions, hallucinations, and disorganized thinking. Insomnia is among the strongest predictors of psychosis onset or relapse for those with both chronic and first-episode psychosis. Poor sleep quality, a core feature of chronic insomnia, predicts dissatisfaction with social relationships, daily activities, emotional functioning, and quality of life. Chronic insufficient sleep causes deficits in cognitive functioning generally, which are exacerbated in SMI. Little is known about how various sleep parameters predict psychotic symptoms and whether these relationships are mediated by functional deficits. We collected data from 63 Veterans with SMI and insomnia and assessed (1) core features of psychiatric symptomatology, (2) sleep parameters from self-report, actigraphy, and sleep diaries, and (3) measures of functioning.

Methods: The sample was N=63 Veterans with SMI. Measures included the Specific Psychotic Experiences Questionnaire, MATRICS Cognitive Consensus Battery, 14-day sleep parameters computed from participant-completed Consensus Sleep Log-Core diaries, 14-day actigraphy measured sleep parameters, and the Pittsburgh Sleep Quality Index.

Results: There was a significant relation between psychotic experiences and processing speed ($r=-.38$, $p=.002$), but with no other dimension of cognitive functioning. There was a trend for higher actigraphy-assessed sleep latency to be associated with more severe psychotic experiences ($r=.26$; $p=.05$). Multiple Regression tested whether cognitive functioning mediated the relation between sleep quality and specific psychotic experiences. While there was no indirect effect between the sleep quality and psychotic experiences via cognitive functioning (Indirect Effect=.007; $p=.38$), the total effect of sleep quality on psychotic experiences was significant (Total Effect=.06; $p=.03$).

Conclusion: Understanding the mechanisms underlying the development and maintenance of psychosis and cognition in people with SMI is critical to developing novel treatment approaches. This project illuminates the associations between cognitive functioning, sleep, and psychosis. Larger trials should use multimethod assessments to examine the potential for multiple dimensions of functioning to explain the impact of poor sleep on core features of psychiatric symptomatology.

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1131

SLEEP DISORDER COMPLAINTS AND RISKS IN ADULTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER

Reetu Joshi¹, Chuc Luu¹, Emerson Dickstein¹, Eileen Leary², Clete Kushida¹, Emmanuel Mignot³, Katie Cederberg¹

¹Stanford University, ²Centessa Pharmaceuticals, ³Stanford Center for Sleep Sciences and Medicine, Stanford University School of Medicine

Introduction: Attention-Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder affecting 8.83% of adults worldwide. It is characterized by patterns of inattention and/or hyperactivity-impulsivity beginning in childhood, with symptoms often persisting into adulthood. Studies in pediatric ADHD demonstrate a high occurrence of comorbid sleep disorders. However, there is limited research on adult ADHD and comorbid sleep complaints and diagnoses.

Methods: Patients seen at the Stanford Sleep Medicine Center completed the Alliance Sleep Questionnaire (ASQ) as a standard of care (N=28,025). The ASQ is an online sleep questionnaire that collects standardized subjective sleep disorder data. It includes questions on demographics, current sleep complaints and disorders, medical history (e.g., ADHD diagnosis), and validated symptom questionnaires including the Insomnia Severity Index (ISI),

Epworth Sleepiness Scale (ESS), and the Functional Outcomes of Sleep Questionnaire Short Version (FOSQ-10).

Results: Univariate logistic regression controlling for age, sex, body mass index (BMI), race, ethnicity, and other psychiatric diagnoses (anxiety, depression, obsessive-compulsive disorder [OCD], post-traumatic stress disorder [PTSD], bipolar, psychosis, and eating disorders [ED]) identified that people with ADHD (n=1,253 [4.5%]) were more likely to report complaints of snoring (OR=1.21[1.05,1.40]; $p_{adj}=0.21$), daytime sleepiness (OR=2.3[1.89,2.80]; $p_{adj}=1.79e-15$), insomnia (OR=2.0 [1.70,2.37]; $p_{adj}=9.94e-15$), restless legs syndrome (RLS) (OR=1.49[1.28,1.73] $p_{adj}=6.4e-6$), and narcolepsy (OR=1.52 [1.31,1.77]; $p_{adj}=1.5e-6$), and had a higher risk of sleep apnea (OR=1.58[1.35,1.85]; $p_{adj}=3.18e-7$) and bruxism (OR=1.74 [1.44,2.12]; $p_{adj}=4.16e-7$). Individuals with ADHD reported higher scores for the ESS (OR=1.02[1.01,1.036]; $p_{adj}=0.013$) and ISI (OR=1.05[1.04,1.06]; $p_{adj}=5.06e-18$), and lower scores on the FOSQ-10 (OR=0.89[0.87,0.90]; $p_{adj}=1.35e-36$). Multivariate forward stepwise regression demonstrated that compared to adults without ADHD (n=19,856), adults with ADHD (n=923[4.44%]) had a higher risk of comorbid psychiatric diagnoses, and certain sleep disorders such as RLS, bruxism, and sleep apnea. Adults with ADHD scored lower on the FOSQ-10 and reported higher complaints of insomnia.

Conclusion: Adult ADHD is associated with a higher risk of some sleep disorders independent of psychiatric diagnoses. Individuals report worse outcomes of sleepiness on daily functioning. Future research should investigate whether these co-occurrences are due to common symptomatology leading to crossover diagnoses or whether this arises from distinct underlying mechanisms. Future research should also examine the impact of ADHD pharmacotherapy on functional outcomes and sleep disorder risks.

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1132

SLEEP INERTIA IS A KEY MARKER IN ADULT ADHD

Maurice Ohayon¹, Stephanie Duhoux², Marie-Lise Cote³

¹Stanford University School of Medicine, ²EVAL Research Institute (EVALRI), ³Centre d'Evaluation et de Statistique (CES)

Introduction: Attention-deficit/hyperactivity disorder (ADHD) is increasingly understood as a disorder involving not only executive dysfunction but also disturbances in arousal regulation. Daytime sleepiness, sleep inertia, and impaired alertness may contribute to attentional instability and chronic functional impairment, yet population-based longitudinal data on these associations remain scarce. This study focuses on examining the role of daytime sleepiness and sleep-wake regulation factors associated to the presence and persistence of ADHD.

Methods: A representative sample of non-institutionalized U.S. adults aged ≥ 18 years was interviewed in two waves between 2002 and 2015 using the Sleep-EVAL system, an AI-driven diagnostic platform. Wave 1 (W1) included 15,929 participants, of whom

10,931 were interviewed again approximately three years later (W2). ADHD diagnoses were based on DSM-5 criteria. Logistic regression models were performed to identify predictors associated with ADHD and its persistence (present at both interviews). The models emphasized sleep-wake symptoms including sleep inertia, subjective sleepiness across contexts, insomnia, non-restorative sleep, and fatigue.

Results: At W1, 5.7% of adults met criteria for ADHD, decreasing to 4.5% at W2; nearly half (47.4%) of cases remained persistent over three years. ADHD was more frequent in men and declined significantly after age 55. Sleep-wake disturbances were among the strongest predictors of ADHD at W1. Sleep inertia showed the largest association (OR=4.63), followed by severe fatigue (OR=2.07) and sleepiness in situations requiring high attention (OR=1.45). Insomnia and non-restorative sleep were not independently associated with ADHD when arousal-related variables were included. For ADHD persistence, the presence of sleep inertia at W1 was a strong predictor (OR=5.68), along with severe fatigue (OR=4.86) and insomnia (OR=1.43). Comorbid depressive (OR=2.62) and anxiety disorders (OR=1.34) at W1 also predicted ADHD persistence.

Conclusion: ADHD in adults is strongly associated with symptoms of impaired arousal regulation, particularly morning sleep inertia, context-dependent daytime sleepiness, and severe fatigue. These disturbances are not only cross-sectional correlates but also major determinants of ADHD persistence over time.

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1133

SLEEP DISTURBANCES IN PATIENTS WITH SCHIZOPHRENIA

Alejandro Jimenez-Genchi¹, Cesar Celada-Borja¹, Maria Cook-Arrieta², Anahid Gonzalez-Lojero², Pamela Moragrega-Recinas², Monica Ocádiz-Guerrero², Mauricio Rosel-Valdes¹, Camila Salas-Garibay¹, Stephanie Pruefer-Martinez², Viridiana Arias-Bujanda¹

¹Instituto Nacional de Psiquiatría Ramón de la Fuente,

²Universidad Anahuac Sur

Introduction: Although abnormalities in sleep continuity and architecture are common in schizophrenia and patients with this chronic psychotic disorder are exposed to risk factors for the development of sleep disturbances, few studies have assessed the prevalence of sleep disorders in this clinical population and their results are mixed. Based on this, we aimed to compare the frequency of sleep disturbances between patients with schizophrenia and control subjects.

Methods: Eighty six patients with schizophrenia and 43 control subjects were assessed with the insomnia severity index, the Holland Sleep Disorders Questionnaire, the Berlin Questionnaire, the Sleep Apnea Clinical Score, the Pittsburgh Sleep Quality Index and the Restless Legs Syndrome Index. Comparisons between groups were performed using Chi square/Fisher Exact Test or t test.

Results: There were no significant differences in sex (37.2 vs 37.2 % of female) and age (42.9 SD 14.6 vs 45.4 SD 15.3, $p=.35$). Patients with schizophrenia showed higher scores on insomnia (9.7 SD 5.9 vs 7.0 SD 5.6, $t=2.39$, $p=.01$) and sleep quality (7.5 SD 3.6 vs 5.5 SD 3.1, $t=9.73$, $p<0.001$). Circadian rhythm sleep disorders showed a trend to be significantly more frequent among patients with

schizophrenia (11.6 % vs 2.3 %, Fisher Exact Test $p=.09$). There were no significant differences between schizophrenia and control subjects in sleepiness severity and the frequency of Restless Legs Syndrome (11.6 vs 18.6 %), obstructive sleep apnea (27.9 vs 20.9 %), insomnia disorder (10.5 vs 4.7 %), parasomnias (5.4 vs 2.3 %).

Conclusion: These results suggest that patients with schizophrenia present with poor sleep quality and insomnia symptoms; however, sleep disorders such as sleep apnea, parasomnias, RLS and insomnia disorder are not significantly more frequent.

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1134

THE ROLE OF HSCRP AS A MODERATOR IN THE ASSOCIATION BETWEEN SLEEP QUALITY AND MENTAL ILLNESS

Matthew Betancourt¹, Carolina Scaramutti², Brittany Larsen², Gabrielle Belony¹, Kennedy Morgan Brown¹, Clarence Earl Locklear¹, Denise Christina Vidot¹, Azizi Seixas², Judite Blanc¹, Michael Grandner³, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³University of Arizona

Introduction: High-sensitivity C-Reactive Protein (hs-CRP) is an inflammatory biomarker linked to cardiovascular and mental health. However, its role as a moderator of observed associations between sleep quality and mental health is understudied, particularly in Black populations, who are characterized by important population-level health disparities. This study examines whether hs-CRP moderates the relationship between sleep quality and anxiety/depression among Black adults residing in New York City and South Florida.

Methods: Participants ($N = 210$; 73.8% female; mean age 52.14 ± 13.95 years; mean BMI = 29.69 ± 6.56) were Black adults enrolled in two NIH-funded studies (MOSAIC & ESSENTIAL) examining sleep health and related medical health outcomes. Variables showing non-Gaussian distributions were log10-transformed to remove skewness, improve normality, and harmonize data from the two studies prior to analyses. Data included baseline surveys, one week of sleep monitoring via Sleep Image Ring (yielding the Sleep Quality Index, SQI), and fasting blood draws to assess hs-CRP levels. Moderation analyses were conducted using PROCESS version 5.0 in IBM SPSS to test whether hs-CRP moderated the association between SQI and self-reported depression and anxiety, controlling for BMI, sex, employment status, sleep apnea diagnosis, and usage of antidepressants, hypnotics, and minor tranquilizers.

Results: Regarding anxiety, the SQI $\times$ hs-CRP interaction was significant ($\chi^2 = 5.69$, $p = 0.017$). Conditional effects indicated that poorer sleep quality was associated with greater anxiety at low hs-CRP levels ($b = -0.048$, $p = 0.016$), but not at different hs-CRP levels. Johnson-Neyman analysis identified a region of significance below -0.25 SD of hs-CRP. Regarding depression, the SQI $\times$ hs-CRP interaction was not significant ($\chi^2 = 2.04$, $p = 0.153$), and conditional effects were nonsignificant across all levels of hs-CRP.

Conclusion: These findings suggest that hs-CRP may influence the link between sleep quality and anxiety, but not depression. Poor sleep was associated with higher anxiety, primarily among individuals with lower hs-CRP levels. These results emphasize the

role of inflammation in sleep-related anxiety among Black adults and the need for further study of the mechanisms underlying effects of sleep, inflammation, and lifestyle factors on mental health outcomes.

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1135

NEUROMODULATION-POWERED NAPS: BOOSTING SLEEP'S RESTORATIVE POTENTIAL

Seo Ho Song, Jinwon Chang, Nur Kader, Shengzi Zeng, Tony Cunningham

Beth Israel Deaconess Medical Center

Introduction: Sleep disturbances and cognitive deficits are hallmark, debilitating features in schizophrenia. High-definition transcranial direct current stimulation (HD-tDCS) is a promising non-invasive approach to modulate restorative sleep and sleep-dependent memory consolidation, potentially addressing cognitive impairments that are resistant to conventional pharmacological interventions.

Methods: Ten healthy participants underwent within-subject, counterbalanced nap sessions with either bifrontal HD-tDCS or sham stimulation delivered during Stage 2 (N2) sleep. High-density electroencephalographic recordings enabled characterization of spectral power and temporal dynamics in key sleep oscillations: SO (0.5-1 Hz), slow spindles (9-12 Hz), and fast spindles (12-15 Hz). Pre- and post-nap cognitive assessments evaluated procedural memory (motor sequence task) and declarative memory (word-pair associates).

Results: In contrast to sham controls, HD-tDCS significantly increased frontal SO power ($p = 0.02$, $r = -0.818$) in the interval immediately following stimulation without altering spindle density, amplitude, duration, or power. However, the refractory period between spindle events in the period following completion of the stimulation protocol was significantly reduced ($p = 0.041$, $r = 0.588$) in the active HD-tDCS condition, unlike the sham controls. SO-spindle coupling remained unchanged. Behaviorally, active HD-tDCS enhanced procedural memory consolidation ($p = 0.010$, $r = -0.891$) but not declarative memory performance.

Conclusion: Targeted HD-tDCS during nap-time sleep amplifies SO and modulates spindle temporal dynamics with observed enhancements in procedural memory consolidation. Notably, core features of spindles remained intact: their density, amplitude, duration, or power as well as their coupling with SO. This suggests that active neuromodulation during sleep may prime key thalamocortical circuitry for more frequent spindle generation without altering intrinsic spindle characteristics or fundamental temporal coordination underlying memory consolidation. These preliminary results establish a mechanistically grounded foundation for developing high-precision, sleep-based interventions with potential to correct pathologies in sleep architecture and cognition in schizophrenia.

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1136

TRAUMA-ASSOCIATED SLEEP DISORDER IN YOUNG SERVICE MEMBERS: EVALUATING SYNUCLEINOPATHY BIOMARKERS TO ASSESS NEURODEGENERATION RISK

Margaux Salas¹, Zahari Tchopev², Jessie Jacobson³, Matthew Brock², Elijah Miranda⁴, Victoria Nguyen³, William Hoffman³

¹59th Medical Wing Science & Technology Office, ²Wilford Hall Ambulatory Surgical Center, ³Brooke Army Medical Center, ⁴The Geneva Foundation

Introduction: Trauma-associated sleep disorder (TSD) is an emerging parasomnia increasingly recognized in young service members who present with loud vocalizations, complex dream enactment, and autonomic arousal during disturbing dreams following a trauma. Clinically, TSD appears distinct from nightmare disorder and PTSD-related sleep disturbance, exhibiting behaviors suggestive of impaired REM-atonía regulation. This phenotype has notable overlap with isolated REM sleep behavior disorder (iRBD), in which dysfunction of pontine and medullary circuits responsible for REM muscle atonia leads to motor dream enactment and is strongly linked to underlying synucleinopathy. The parallels between TSD and iRBD raise the mechanistic question of whether TSD may similarly reflect disruption of REM-atonía pathways or early prodromal neuronal injury. This study evaluates phosphorylated α -synuclein (p- α -syn) via a validated skin biopsy to determine whether individuals with TSD exhibit biomarker evidence associated with neurodegeneration risk.

Methods: Participants aged 18–50 with clinically suspected TSD were referred from our academic military Sleep Disorder Center. After informed consent was obtained, eligibility was confirmed through comprehensive chart review. Enrolled participants completed a structured neurologic evaluation, validated sleep and neurobehavioral questionnaires, and a skin biopsy performed at the Department of Neurology. Three 2–3 mm punch biopsies (posterior cervical region, proximal leg, distal leg) were processed using a standardized protocol to assess p- α -syn status, intraepidermal nerve fiber density, and additional cutaneous biomarkers. Clinical data collected included sleep history, autonomic features, neurologic symptoms, MDS-UPDRS findings, and results from validated instruments assessing sleep quality, insomnia severity, daytime sleepiness, and dream enactment behaviors.

Results: Data collection is ongoing. This abstract describes study design, biomarker acquisition procedures, clinical and military-related history, physical examination, and planned analyses to evaluate the prevalence and pattern of p- α -syn positivity in TSD.

Conclusion: We present a prospective biomarker study evaluating whether trauma-associated sleep disorder may represent a prodromal marker of synucleinopathy in a young service member population. Identifying p- α -syn deposition in TSD will support a novel neurodegeneration-risk signal, providing a potential early detection pathway for long-term neurological monitoring and intervention. Findings from this study will help clarify whether TSD reflects downstream neurodegenerative processes, post-traumatic neural injury, or a distinct parasomnia phenotype.

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1137

EFFECTS OF A CHRONOTHERAPEUTIC INTERVENTION IN ADOLESCENTS ON REWARD AND IMPULSIVITY MEASURES RELATED TO SUBSTANCE USE RISKBrant Hasler¹, Jessica Levenson², Margaret Kuzemchak³, Ronette Blake³, Israel Edery³, Meredith Wallace², Peter Franzen¹, Adriane Soehner², Daniel Buysse², Duncan Clark³¹University of Pittsburgh School of Medicine, ²University of Pittsburgh, ³University of Pittsburgh Medical Center

Introduction: Cross-sectional and prospective data in adolescents indicate that sleep and circadian rhythm characteristics are related to substance use and related problems. Experimental rodent and human data suggest sleep deprivation and circadian misalignment alter reward sensitivity and impair impulse control. Adolescents subjected to early school start times suffer sleep loss and circadian misalignment, and thus may be at particular risk for substance use through reward- and/or impulsivity-related mechanisms. In a sample of adolescents in middle or high school, we tested whether a chronotherapeutic intervention altered reward sensitivity and/or impulsivity relative to a control condition.

Methods: Sixty-eight 13-15 year-old middle/high school students (34 female) completed a 2-week baseline protocol before completing a randomly-assigned 2-week chronotherapeutic intervention (n=33) or a sleep-monitoring control condition (n=35). Participants assigned to the intervention maintained a stable wake-up time, 30 minutes morning bright light (via Re-Timer glasses), 2 hours evening dim light (via blue-blocking glasses), and a 1.5-hour earlier weeknight bedtime. Sleep was assessed via actigraphy during 2-week baseline and experimental periods. Each concluded with an overnight sleep lab visit during which circadian phase was assessed with the dim light melatonin onset (DLMO), while reward and impulsivity were assessed via self-report (BIS/BAS; UPPS-P) and behavioral tasks (Balloon Analogue Risk Task [BART]; Cued Go/No-Go Task [CGNG]). Mixed models accounted for biological sex.

Results: The intervention advanced DLMO by 34 minutes ($B=-0.57$, $p=0.019$) and extended weeknight total sleep time by 35 minutes ($B=0.58$, $p=0.005$) relative to the control. Behavioral impulsivity (CGNG) worsened in the control condition relative to the intervention ($B=0.08$, $p=0.023$). Across both groups, advances in DLMO correlated with increases in behavioral reward motivation (BART; $B=-3.18$, $p=0.014$).

Conclusion: Our preliminary findings suggest that a novel chronotherapeutic intervention may alter reward sensitivity and impulsivity in complex ways. However, most of the sample had not initiated substance use, and it remains unclear whether effects would generalize to adolescents with greater substance use, or if a longer-term intervention and/or follow-up period might reveal further effects. Future studies should consider longer-term interventions in substance-using adolescents to test impact on reward and impulsivity processes as well as substance use itself.

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1138

USE OF Z-DRUGS AND TRAZODONE FOR SLEEP PROBLEMS IN CHILDREN AND YOUTH WITH ADHDGreta Bushnell¹, Jessica Lunsford-Avery², Daniel Horton¹, Elizabeth Suarez¹, Tobias Gerhard¹, Jason Roy³, Yuyang Zhu¹, Kristen Lloyd¹, Julianne Varga¹, Craig Newcomb¹, Mark Olfson⁴¹Rutgers Center for Pharmacoepidemiology and Treatment Science, ²Duke University School of Medicine, ³Department of Biostatistics and Epidemiology, Rutgers School of Public Health, ⁴Department of Psychiatry, Columbia University Irving Medical Center

Introduction: Up to 70% of children and youth with ADHD suffer from sleep problems, and sleep problems are also a frequent side effect of stimulants, the first-line ADHD treatment. Z-drugs and trazodone are often prescribed for sleep problems; yet little is known on the clinical characteristics of children and youth who initiate these medications and how long they remain on treatment. We therefore aimed to characterize children and youth with ADHD who start z-drugs or trazodone and estimate their treatment duration.

Methods: Using MarketScan (2008-2023) administrative claims data for privately-insured US individuals, we identified children (5-11y), adolescents (12-17y), and young adults (18-29y) with ADHD initiating a z-drug or trazodone for a sleep problem, following 1+ year without prior dispensed prescription for that medication. Trazodone initiators also needed a recent (0-30 days) sleep problem diagnosis. We described ADHD treatment history, comorbid psychiatric diagnoses, and medication use. Treatment duration was estimated with Kaplan-Meier analysis, stratified by age, censoring at treatment end, disenrollment, or data end.

Results: We identified 27,597 children and youth with ADHD initiating a z-drug (mean age=22y, 47% male) and 15,129 initiating trazodone for a sleep problem (mean age=20y, 49% male). Stimulants were frequently prescribed in the year before starting treatment (z-drug: 77-82%; trazodone: 70-81%, across age groups). Alpha-agonists were also commonly dispensed before z-drug and trazodone initiation, respectively, to children (61%, 71%) and adolescents (23%, 30%). Clinical characteristics varied by age; anxiety disorders were the most frequent comorbidity followed by depression. Continuation of trazodone for 6+ months occurred in 44% of children, 26% of adolescents, and 19% of young adults. For z-drug initiators, continuation for 6+ months was lower than trazodone for children (11%) and adolescents (14%) but similar for young adults (15%). Few z-drug initiators (5-7%) continued treatment for 1+ year, with trazodone use for 1+ year varying by age (children=30%, adolescents=13%, young adults=9%).

Conclusion: Z-drug and trazodone are commonly used by children and youth with ADHD for sleep problems. Understanding these use patterns can inform efforts to improve cautious treatment utilization as well as future research on treatment effectiveness and safety.

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1139

EFFECT OF SLEEP DURATION INTERVENTION ON SUICIDE ATTEMPTS IN PATIENTS WITH PSYCHIATRIC DISORDERS: A TARGET TRIAL EMULATION

Chengkai Wu¹, Yirong Li², Yuru He¹, Haoting Fang¹, Chuqing Pan¹, Jia Li³, Zikun Xie³, Wenyuan Li¹, Tao-Hsin Tung⁴, Li Liu¹

¹Department of Health Management, Nanfang Hospital, Southern Medical University, ²Department of Pediatrics, Women and Children's Hospital, School of Medicine, Xiamen University, ³Division of Orthopaedic Surgery, Department of Orthopedics, Nanfang Hospital, Southern Medical University, ⁴Evidence-Based Medicine Center, Taizhou Hospital of Zhejiang Province Affiliated to Wenzhou Medical University

Introduction: Sleep duration may associated with suicide attempts (SA) in patients with psychiatric disorders, but it remains uncertain whether interventions targeting sleep duration can effectively prevent SA in those people. This study was to evaluate whether adopting a normal sleep duration can prevent SA among patients with psychiatric disorders, and across specific diagnostic subgroups, using a target trial emulation based on observational data.

Methods: A target trial emulation was designed using the UK Biobank data. Eligible participants were patients with psychiatric disorders, diagnostic subcohorts for substance use disorders, depression, anxiety disorders and psychotic disorders were additionally defined. The intervention was adopting normal sleep duration (7-8 h/day), compared with abnormal (≤ 6 or ≥ 9 h/day). The outcome was SA, ascertained through linked hospital and mortality records. We applied inverse probability treatment weighting to balance confounders. Weighted Cox models estimated hazard ratios for SA in the main cohort and across diagnostic subtypes. Sensitivity analyses excluded individuals with a prior SA and separately assessed comparisons with short and long sleep duration.

Results: A total of 81 747 participants were included (49 838 in the intervention group and 31 909 in the control group), with SA rates of 1.20% and 2.00%, respectively. Adopting normal sleep duration at baseline was associated with a lower risk of SA (HR: 0.72, 95%CI: 0.65-0.81), with divergence emerging early in the risk curves. Sensitivity analyses yielded consistent findings. Results for substance use disorders (HR: 0.64, 95%CI: 0.52-0.78), depression (HR: 0.82, 95%CI: 0.72-0.94) and anxiety disorders (HR: 0.62, 95%CI: 0.50-0.78) aligned with the main analysis, whereas no significant protective association was observed in the psychotic disorders cohort (HR: 0.80, 95%CI: 0.50-1.27).

Conclusion: Adopting normal sleep duration confers a protective effect against SA in patients with psychiatric disorders. The magnitude of this benefit may vary by the severity and nature of the underlying psychiatric condition. These findings highlight sleep duration as a clinically meaningful and modifiable behavioral factor for SA prevention. Integrating targeted sleep-management

strategies into routine psychiatric care may offer a feasible and actionable approach to prevent SA.

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1140

PRELIMINARY FINDINGS OF SLEEP TREATMENT PREFERENCES OF CAREGIVING FAMILY MEMBERS OF ADULTS WITH SERIOUS MENTAL ILLNESS

Nicole Gumpert¹, Rachel Manber²

¹Stanford University, ²Department of Psychiatry and Behavioral Sciences, Stanford University, US

Introduction: Emerging data indicates that poor sleep health is common among familial caregivers of adults with serious mental illness (SMI), consistent with what has been observed among familial caregivers of patients with dementia and cancer. Improving sleep health among caregivers of family with SMI may be important. Sleep health is linked to physical and mental well-being, both of which are likely already burdened by the stresses of caregiving. Existing sleep health interventions may not fully address the challenges facing these caregivers. The current study aimed to describe sleep difficulties experienced by caregivers for adult family with SMI and to determine their sleep treatment preferences.

Methods: An anonymous survey was completed by 20 caregivers of family with SMI (85% women, 90% White, mean age = 61.5 years). Caregivers were recruited through professional organizations that support families navigating SMI (e.g., National Alliance on Mental Illness, Courage to Caregivers). The survey included questions asking about their caregiving experience, sleep difficulties, and preferences for sleep treatment.

Results: Caregivers provided care most commonly for a family member with a schizophrenia spectrum disorder, bipolar disorder, major depression, and/or generalized anxiety disorder diagnosis. Most (80%) cared for an adult offspring; the remaining provided care for a spouse/partner, parent, grandparent, or niece/nephew. Most caregivers experienced sleep difficulties (84%) and, of these, most (94%) note their sleep is impacted by caregiving. Their sleep difficulties include difficulty staying asleep (69%), difficulty turning off their mind at night (69%), low quality/unrefreshing sleep (56%), difficulty falling asleep (50%), and not enough sleep (32%). More than half see addressing their sleep as a high to very high priority. A majority (93%) prefer self-help tools as their first choice of treatment options. A small proportion (7%) selected help from professional as top choice and 0% selected help from a peer as their top choice.

Conclusion: Caregivers experience sleep difficulties and would like to improve sleep, preferably through self-help tools. These findings can inform the development of an acceptable sleep health intervention in this often overlooked group.

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1141

INSOMNIA AND DEPRESSIVE SYMPTOM PATTERNS PREDICT DEMENTIA INCIDENCE IN COMMUNITY-DWELLING OLDER ADULTS: A TEN-YEAR STUDY

Sofia Liu¹, Zixuan He², Junxin Li¹¹School of Nursing, Johns Hopkins University, ²Bloomberg School of Public Health, Johns Hopkins University

Introduction: Insomnia and depressive symptoms often co-occur in late life and are individually or jointly linked to increased dementia risk. However, heterogeneity in these symptom clusters and their links to dementia remains understudied. This study aims to identify insomnia-depression symptom profiles using latent profile analysis (LPA) and examine their associations with subsequent incident dementia, as well as whether these associations persist after accounting for comorbidity, in community-dwelling older adults.

Methods: We used data from the National Health and Aging Trends Study (NHATS), a nationally representative longitudinal cohort of U.S. older adults followed annually from 2011 (R1) to 2023 (R13). The analytic sample was restricted to participants from the 2011 (R1) and 2015 (R5) enrollment cohorts. Baseline phenotypes were defined using continuous Patient Health Questionnaire-2 (PHQ-2; range 0-6) scores and a two-item insomnia severity score capturing difficulty initiating sleep and difficulty maintaining sleep, with each item coded on a 1-5 Likert scale and summed (total range 2-10). Dementia was determined using NHATS consensus criteria. To ensure symptoms preceded dementia onset, participants who developed dementia within two years after enrollment were excluded. Dementia incidence was then followed for up to 12 years. LPA identified optimal symptom phenotype profiles using model fit indices (BIC, entropy). Cox proportional hazards models estimated the hazard of incident dementia adjusting for sociodemographic and health characteristics.

Results: The sample included 4,661 community-dwelling older adults (27.3% aged 65-69, 48.3% aged ≥ 75 , 60.1% female, 71.9% non-Hispanic White), followed for an average of 10.9 years. LPA revealed four profiles: "Insomnia-predominant" (27.5%), "Low-symptom" (10.5%, reference), "Moderate-co-symptom" (44.1%), and "Depression-predominant" (17.9%). In Cox proportional hazard models, compared with "Low-symptom", both "Moderate-co-symptom" (HR=1.93, 95% CI: 1.44-2.57) and "Depression-predominant" (HR=1.92, 95% CI: 1.41-2.62) showed nearly two-fold higher dementia risk after full adjustment. The "Insomnia-predominant" profile was not associated with increased dementia risk (HR=1.07, 95% CI: 0.78-1.47).

Conclusion: Profile marked by moderate insomnia-depressive symptoms or depression-predominance were associated with higher dementia risk over 10 years, even after accounting for comorbidity. These findings highlight the value of evaluating multi-symptom patterns rather than isolated sleep complaints to identify older adults at elevated dementia risk and facilitate targeted interventions.

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1142

OBSTRUCTIVE SLEEP APNEA, USE OF POSITIVE AIRWAY PRESSURE THERAPY, AND DEMENTIA INCIDENCE: A LONGITUDINAL STUDY OF MEDICARE BENEFICIARIES

Galit Levi Dunietz, Xiru Lyu, Henry Paulson, Ronald Chervin, Kerby Shedden, Tiffany Braley
University of Michigan

Introduction: Although obstructive sleep apnea (OSA) is linked to a higher incidence of dementia, additional data are needed on whether OSA represents a modifiable risk factor for dementia. We assessed the risk of incident dementia among Medicare beneficiaries with and without OSA, and among those with OSA who showed evidence vs. no evidence of adherent positive airway pressure (PAP) use.

Methods: Data were derived from fee-for-service claims from a random 20% sample of Medicare beneficiaries aged 65y and older who obtained care from 2010-2019 and were free of dementia at baseline. OSA and dementia diagnoses were identified with ICD-9/10 codes. PAP "adherent" users had ≥ 2 HCPCS codes for PAP supplies separated by ≥ 30 days and submitted during the first 3 years of the first identifiable claim. Generalized estimating equations were utilized to estimate sex- and race-specific cumulative dementia incidence by OSA status and PAP usage. Models were adjusted for age, race, ethnicity, and area deprivation index.

Results: Among 14,902,187 beneficiaries, OSA was present in 7% of women and 11% of men. Among beneficiaries with OSA, 35% of women and 39% of men were PAP adherent. By age 85, cumulative dementia incidence was 12.0% in women with OSA versus 9.0% in women without an established OSA diagnosis, and 10.3% versus 7.7% in men with and without an OSA diagnosis. Among beneficiaries with OSA, by age 85y, cumulative dementia incidence in PAP adherent vs. non-adherent use was 10.3% vs. 12.4% for women and 8.8% versus 10.7% for men, suggesting a relative risk reduction of 17.4% and 17.6% respectively.

Conclusion: OSA is associated with an increased risk of dementia, and exposure to adherent use of PAP is associated with partial mitigation of this risk. These results cannot prove cause-and-effect, but they strengthen existing evidence that OSA is a modifiable risk factor for dementia.

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1143

COGNITIVE OUTCOMES OF 12-MONTH CPAP THERAPY IN AMNESTIC MILD COGNITIVE IMPAIRMENT (MCI)

Nalaka Gooneratne¹, Stephen Moelter², Wenyan Ji³, Alicia Lozano³, Hanlon Alexandra³, Luqi Chi⁴, Eric Davis⁵, Cynthia Cheng⁶, Vani Vallabhaneni⁷, Jieun Lim⁸, David Wolk¹, Kathy Richards⁹¹University of Pennsylvania, ²Saint. Joseph's University, ³Virginia Tech, ⁴Washington University, ⁵University of Virginia, ⁶Thomas Jefferson University, ⁷Sleep 360 Sleep Diagnostic Center, ⁸University of Pennsylvania School of Nursing, ⁹University of Texas

Introduction: Obstructive sleep apnea (OSA) prevalence approaches 60% in older adults with mild cognitive impairment (MCI). The primary aim of this quasi-experimental clinical trial, “Changing the Trajectory of Mild Cognitive Impairment with CPAP Treatment of Obstructive Sleep Apnea”, was to determine the effect of CPAP adherence on cognitive function over 1 year.

Methods: Study inclusion criteria: Age 55-85, and amnesic MCI based on established testing criteria. Those who chose to try CPAP received a tailored telehealth CPAP adherence intervention and those who chose not to try CPAP received a telehealth attention control intervention. Participants were divided into a CPAP-adherent group (> 4 hours use per night) or a CPAP-non-adherent group (< 4 hours use per night). The pre-specified primary cognitive outcome was psychomotor/cognitive processing speed as measured by the Digit Symbol Coding (DSC) test. Percent change at 6 and 12 months from baseline were compared. The CPAP adherent and non-adherent groups were compared using propensity score-weighted linear regression analysis.

Results: At 12 months, 116 (63.0%) were CPAP adherent and 68 (37.0%) were not. Mean age was 67.3 years (sd. 7.5); 55.4% were male; 71.2% were White persons, and 7.1% were of Hispanic ethnicity. Mean AHI was 33.4 (sd. 20.7). At 6 months, the percent change from baseline in psychomotor/cognitive processing speed in the CPAP adherent group was 7.83% greater than the CPAP non-adherent group (95% C.I.: 2.50, 13.16, $p=0.004$). At 12 months, group differences were not statistically significant. Adherent participants with less cognitive impairment [Clinical Dementia Rating (CDR) score = 0] at baseline had a 15.7% improvement in DSC at 6 months relative to the CPAP non-adherent group ($p < .05$). Adherent participants with a baseline CDR = 0.5 (indicative of greater cognitive impairment) had a 7.75% improvement in psychomotor/cognitive processing speed relative to the CPAP non-adherent group ($p < 0.05$).

Conclusion: In older adults with MCI and moderate-severe OSA, the CPAP adherent group, compared to CPAP non-adherent group, had significantly better psychomotor/cognitive processing speed at 6 months, but not at one year. Participants with less severe baseline cognitive impairment demonstrated the largest gains in cognitive performance.

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1144

LATE-LIFE CHANGES IN SLEEP DIFFICULTY AND INCIDENT DEMENTIA RISK: A PROSPECTIVE COHORT ANALYSIS

Ronan Goel¹, Matthew Weaver², Stuart Quan³, Charles Czeisler⁴, Rebecca Robbins¹

¹Division of Sleep Medicine, Harvard Medical School, ²Brigham and Women's Hospital, Mass General Brigham, ³Harvard Medical School, ⁴Brigham and Women's Hospital

Introduction: Sleep health evolves in late adulthood, yet the relative contributions of short- and long-term fluctuations in sleep difficulties to dementia risk remain unclear. Using a nationally representative dataset, we sought to inform whether patterns of sleep difficulty were prospectively associated with incident dementia risk among older adults in U.S.

Methods: We analyzed 6,376 adults ≥ 65 years in the nationally representative National Health and Aging Trends Study (NHATS; 13-year follow-up, with three sample refreshes). Sleep difficulties were characterized as: (1) difficulty falling asleep; or (2) maintaining sleep each year. Frequency was collected on 5-point Likert scales from rarely to every night. We derived: (1) cumulative sleep reserve, defined as the time-updated proportion of prior study years without sleep difficulties (score from 0% to 100% good-sleep years); (2) recent sleep trajectory, categorized as improving (less frequent), stable (no change), or worsening (more frequent) in the preceding three years; (3) sleep stability, defined as the within-person standard deviation of sleep difficulty frequency. Incident dementia was determined by self-reported diagnosis or performance on validated measures. We used Cox proportional hazard modeling to ascertain incident dementia risk.

Results: Dose-response analyses showed a smooth, graded decline in dementia risk with increasing cumulative sleep reserve. Each additional 10% of accumulated good-sleep years was associated with ~5–6% reduction in dementia hazard (difficulty falling asleep: HR=0.95, 95%CI: 0.94–0.96, $p < 0.001$; difficulty maintaining sleep: HR=0.94, 95%CI: 0.93–0.95, $p < 0.001$). Among adults with high cumulative sleep reserve, a recently worsening trajectory was associated with increased dementia risk (falling asleep: HR=1.26, 95%CI: 1.13–1.39, $p < 0.001$), relative to a recently stable trajectory. Finally, greater within-person variability in reported sleep difficulties was associated with higher dementia risk (falling asleep: HR=1.82, 95%CI: 1.56–2.13, $p < 0.001$; maintaining sleep: HR=1.43, 95%CI: 1.18–1.75, $p < 0.001$).

Conclusion: Cumulative sleep reserve showed a strong, graded prospective dose-response association with dementia risk, with each incremental increase in proportion of good-sleep years providing additional protection. The finding that recent worsening in those with high reserve increases dementia risk may reflect the preclinical/prodromal stage of dementia. Our analysis revealed that greater within-person fluctuation in reported sleep difficulties was associated with higher dementia risk, underscoring the importance not only of how good sleep is but how consistently good it remains over time.

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1145

THE SYN-SLEEP STUDY: DETECTION OF CUTANEOUS PHOSPHORYLATED ALPHA-SYNUCLEIN IN REM SLEEP BEHAVIOR DISORDER

Todd Levine¹, Bailey Bellaire¹, Sarrah Marcotte¹, Jourdan Parent¹, Manuel Duval¹, Roy Freeman², Christopher Gibbons²

¹CND Life Sciences, ²Beth Israel

Introduction: Isolated REM sleep behavior disorder (iRBD) is a prodromal neurodegenerative disease characterized by dream reenactment and REM sleep atonia. Pathologically, there is deposition of phosphorylated alpha-synuclein (P-SYN) within the central and peripheral nervous system of patients with iRBD. There is a high risk of phenoconversion from iRBD to a clinically apparent synucleinopathy (Parkinson's disease (PD), multiple system atrophy (MSA), or dementia with Lewy bodies (DLB)), with $> 73\%$ of patients phenoconverting over 12 years. We sought: 1) To determine rates

of P-SYN deposition in patients with iRBD, 2) To quantify changes in P-SYN deposition over time, and 3) To determine if patterns of P-SYN deposition predict phenoconversion to a specific synucleinopathy subtype.

Methods: Patients with iRBD (confirmed by polysomnography or validated questionnaire and history) were included in this prospective, blinded multicenter study. Detailed examinations, orthostatic vital signs, and questionnaires were completed. Medical history, ancillary testing, and polysomnograms (PSG) were reviewed, if applicable. Skin biopsies at the distal leg, distal thigh, and posterior cervical sites were collected. Dual immunohistochemical immunostaining for nerve fibers (protein gene product 9.5) and P-SYN were completed with blinded pathological assessment.

Results: 80 subjects (31% female, age 67.8 ± 8.7 years) were enrolled. P-SYN was detected in 75% (60/80) of subjects at baseline. In a preliminary analysis of the first 49 patients to complete 12-month follow-up, the average P-SYN composite score at baseline was 4.06 ± 4.51 , and at the 12-month follow-up was 5.53 ± 5.38 ($p > 0.05$). Four patients that were P-SYN negative at baseline became positive at 12 months. All individuals initially positive for P-SYN remained positive at 12 months. No complications were noted in the biopsy procedure.

Conclusion: Skin biopsy is a safe and highly sensitive method for detection of P-SYN in prodromal disease. Our quantitative analysis of P-SYN revealed a 36% increase over 12 months. Ongoing longitudinal follow up will determine if P-SYN deposition patterns can predict both time to phenoconversion and synucleinopathy subtype.

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1146

ARE MOTOR SYMPTOMS OCCURRING DURING SLEEP AN EARLY PREDICTOR OF PARKINSON'S DISEASE?

Maurice Ohayon¹, Stephanie Duhoux², Marie-Lise Cote³

¹Stanford University School of Medicine, ²EVAL Research Institute (EVALRI), ³Centre d'Evaluation et de Statistique (CES)

Introduction: Parkinson's disease (PD) is a progressive neurodegenerative disorder which may cause sleep disturbances and sleep-related motor dysregulation. This study examined sleep characteristics and sleep-related motor symptoms associated with PD and PD incidence in the general population.

Methods: A representative sample of non-institutionalized U.S. adults aged ≥ 18 years was interviewed in two waves between 2002 and 2015 using the Sleep-EVAL system, an AI-driven diagnostic platform aligned with DSM-IV-TR and ICSD-II criteria. Wave 1 included 15,929 participants, of whom 10,931 were interviewed again approximately three years later. PD diagnosis required physician confirmation. Weighted prevalence estimates, bivariate analyses, and multivariate logistic regression models adjusted for age, gender, race, and antidepressant use were used to identify sleep-related predictors of incident PD.

Results: PD prevalence at baseline was 0.48%, with the highest prevalence among adults ≥ 75 years. At follow-up, the prevalence was 0.71%, also increasing with age. The incidence was 0.078% per year (95% CI: 0.026–0.131%); 87% of incident cases were male. Compared to those without PD, participants with PD showed higher rates of automatic behaviors (12.0% vs. 5.3%; $p < 0.001$), moderate to severe daytime sleepiness (35.5% vs. 25.1% combined), sleep talking (17.1% vs. 3.3%; $p < 0.001$), excessive limb movements during sleep (32.9% vs. 16.3%; $p < 0.001$), and leg jerks at sleep onset (21.1% vs. 5.1%; $p < 0.001$). Muscle weakness symptoms were higher in PD: 47.9% reported ≥ 1 symptom vs. 21.3% in non-PD participants ($p < 0.001$). Multivariate models identified several predictive sleep symptoms for incident PD: teeth grinding nearly every night (AOR=3.78), excessive limb movements during sleep (AOR $\approx$ 2.58), and leg jerks at sleep onset (AOR=9.54–15.64 across models) significantly increased PD risk, independent of age, gender, race and antidepressant use.

Conclusion: PD in the general population is strongly associated with multiple sleep disturbances and nocturnal motor symptoms. Teeth grinding, excessive limb movements, and leg jerks at sleep onset emerged as independent predictors of incident PD. These results suggest that sleep-related motor dysregulation may precede the clinical diagnosis. These findings underscore the potential value of sleep assessments in identifying individuals at risk for PD.

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1147

A MULTIMODAL MACHINE-LEARNING FRAMEWORK FOR QUANTIFYING SLEEP HEALTH USING ACTIGRAPHY AND SUBJECTIVE MEASURES IN PEOPLE WITH STROKE

George Fulk, Keenan Batts, Emily Peterson

Emory University

Introduction: Sleep health is a multidimensional construct that spans objective sleep-wake patterns and subjective experiences. Current measures mainly rely on self-report items. Few approaches have integrated objective and subjective indicators into a unified, data-driven measure of sleep health. The purpose of this study was to develop and validate a multimodal, machine-learning-based Sleep Health Index (SHI) that integrates high-resolution actigraphy data with sleep related self-report measures.

Methods: Data were collected at 10-, 60-, and 90-days post stroke. Participants wore an actigraph for 7 days and completed the Epworth Sleepiness Scale (ESS) and Insomnia Severity Index (ISI) at each time point. Sleep regularity, timing, fragmentation, efficiency, and circadian stability were extracted from multi-day granular actigraphy recordings and derive latent actigraphy features using a temporal convolutional autoencoder. Subjective indicators included sleep satisfaction and daytime alertness. A hierarchical multimodal latent variable model jointly characterized objective and subjective domains, forming the basis of an integrative sleep health construct. The SHI was generated using

supervised machine-learning models trained to predict multimodal latent factor scores, with construct validity assessed via associations with subdomains of RuSATED.

Results: Data from 115 participants was used. Preliminary associations showed coherent convergence across domains. RuSATED defined sleep efficiency aligned strongly with objective sleep consolidation ($r = 0.67$ for efficiency; $r = -0.65$ for WASO; RuSATED defined timing was inversely related to variability in mid-sleep timing ($r = -0.44$, $p < 0.001$). Daytime alertness was associated with wake-time regularity ($r = -0.47$, $p < 0.001$), and sleep dissatisfaction correlated with greater WASO ($r = 0.29$, $p = 0.04$).

Conclusion: This study demonstrates a novel framework for quantifying sleep health that combines high-resolution actigraphy with subjective experiences using multimodal latent modeling and machine learning. The resulting SHI provides a comprehensive, sensitive, and data-driven characterization of sleep health. This approach may apply across diverse clinical populations and offers a flexible, scalable method for integrating wearable data and self-report into a single interpretable construct of sleep health.

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1148

DUAL CLOUD-BASED POSITIVE AIRWAY PRESSURE AND RESPONSIVE NEUROSTIMULATION DATA PLATFORMS IMPROVE LONGITUDINAL MANAGEMENT OF OSA AND EPILEPSY

Joel Oster¹, Sheila Rajan¹, Maneesh Gaddam², Greg Schumaker¹, Rajesh Zacharias¹, Wei He¹, Aarti Grover¹, James Kryzanski¹

¹Tufts University, Tufts Medical Center, ²Hazard ARH Regional Medical Center

Introduction: Undertreated obstructive sleep apnea (OSA) worsens epilepsy. Refractory epilepsy patients may require both positive airway pressure (PAP) therapy and responsive neurostimulation (RNS). Because both PAP and RNS devices generate cloud datasets, integrated review offers unique opportunities to optimize the management of comorbid OSA and epilepsy. This review highlights patients in whom cloud-based patient data management services (PDMS) enabled longitudinal monitoring, treatment adjustments, and improved clinical outcomes

Methods: In an urban medical center with both an Epilepsy Program (National Association of Epilepsy Center NAEC level 4 designation) and a Sleep Medicine Program (Accredited by the AASM- American Academy of Sleep Medicine), 2 cases were identified where dual cloud platforms were being used to manage both Epilepsy and OSA.

Results: Cloud-based PDMS integration for PAP and RNS enabled real-time monitoring, informed programming decisions, and facilitated coordinated care between sleep medicine and epilepsy teams.

Conclusion: Dual cloud-enabled data platforms for PAP and RNS devices can significantly enhance longitudinal management of patients with comorbid OSA and refractory epilepsy. Integrating respiratory and neurophysiologic metrics may improve treatment

adherence, guide device programming, clarify seizure localization, and ultimately optimize clinical outcomes in this complex patient population.

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1149

LATE-LIFE TRAJECTORIES OF NIGHTTIME SLEEP DURATION AND DAYTIME NAPPING IN RELATION TO NEUROPATHOLOGIC MARKERS AT DEATH: THE HONOLULU-ASIA AGING STUDY

Tianyi Huang¹, Susan Redline², Lenore Launer¹, Lon White³

¹National Institute of Aging, ²Brigham and Women's Hospital,

³Pacific Health Research and Education Institute

Introduction: Prior studies on sleep duration and dementia-related neuropathology have primarily relied on self-reports from a single time point, and did not consider daytime napping, a common compensatory mechanism for inefficient nighttime sleep among older adults.

Methods: Our study included 533 Japanese-American men from the Honolulu-Asia Aging Study (HAAS) who self-reported their nighttime sleep duration and daytime napping (in minutes) on at least two of the four exams between 1991–2000, died before 2010 and participated in the HAAS Autopsy Study. We identified three trajectory groups for sleep duration and napping separately using group-based trajectory modeling with time before death as the timescale. Multivariable logistic regression was used to estimate the odds ratio (OR) and 95% CI for the presence of neuropathologic lesions according to the trajectory groups, adjusting for age at death and baseline factors including age, cognitive scores, smoking status, physical activity, BMI, systolic blood pressure, fasting glucose, total and HDL cholesterol.

Results: The mean age (range) was 77 years (71–92) at baseline and 91 years (range: 83–104) at death. Compared with the medium-stable sleep duration group, the long-increasing group had increased odds for the presence of Lewy bodies (OR: 2.28, 95% CI: 1.27–4.08), Braak stages V/VI (OR: 1.83, 95% CI: 1.08–3.10), and neuritic plaques (OR: 1.51, 95% CI: 0.91–2.49); no associations were observed for the short-decreasing group. In contrast, compared with the none-minimum napping group, both moderate-increasing and long-increasing groups had lower odds of microinfarcts, Braak stages V/VI, and neuritic plaques. For example, the OR (95% CI) for neuritic plaques was 0.55 (0.35–0.87) for the moderate-increasing group and 0.46 (0.21–1.03) for the long-increasing group, respectively. Neither sleep duration nor napping trajectories were associated with brain atrophy.

Conclusion: In older Japanese-American men, a long-increasing trajectory of self-reported sleep duration was associated with an increased likelihood of Lewy body and Alzheimer's neuropathology, whereas both moderate-increasing and long-increasing napping trajectories were associated with a lower likelihood of brain lesions implicated in vascular and Alzheimer's neuropathology. Ongoing analyses are exploring the joint associations of sleep duration and napping trajectories with neuropathologic outcomes.

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1150

MEMORY AND EXECUTIVE DYSFUNCTION ARE MORE COMMON AMONG CHILDREN AND ADULTS WITH EPILEPSY AND POOR SLEEP HEALTH

Danielle Wallace¹, Nigel Pedersen², Daniel Drane³¹Emory University, ²UC Davis, ³Emory School of Medicine

Introduction: People with epilepsy (PWE) are 2-3+ times more likely to have poor sleep health and often report cognitive issues, including problems with attention and memory. Given the importance of sleep for cognition and memory consolidation, we hypothesized that memory and executive dysfunction are worse for PWE with poor sleep health.

Methods: This cross-sectional study investigated two U.S. surveys, the 2022 National Health Interview Survey and the 2016-2023 National Survey of Children's Health, to investigate sleep as a modifier of concentration or memory difficulty among Americans with (n=2,675 children; n=496 adults) or without (n=217,579 children; n=27,128 adults) epilepsy. Analyses evaluated self-reported measures of sleep health (bedtime regularity, difficulty falling or staying sleep, sleep duration, or use of sleep medication) and physical activity on cognitive outcomes in survey-weighted Chi-square tests and logistic regression models adjusted for age, sex, education, race and ethnicity, health insurance coverage, and family income ratio.

Results: In the general sample, presence of sleep problems was associated with memory and executive dysfunction (children ORadj=1.5-2.0; adult ORadj=1.8-2.5; p< 0.05), while physical activity was protective (children and adult ORadj=0.5-0.7; p< 0.05). When analyzed by epilepsy status, children with epilepsy (CWE) had >7 times higher odds of memory, concentration, or decision-making difficulty compared to children without epilepsy (ORadj=7.3; 95%CI: 6.21, 8.56; p< 0.001), and AWE had >3.5 times higher odds of memory or concentration difficulty compared to people without epilepsy (ORadj=3.7; 95%CI: 2.6, 4.2; p< 0.001). Among CWE and AWE, worse sleep health, but not physical activity, was associated with greater cognitive difficulty (p< 0.05).

Conclusion: In this large, nationally-representative study, memory and executive dysfunction were worse among PWE with poor sleep health. Memory is often a top concern among PWE, but can be underappreciated by clinicians. Sleep and memory problems may be important factors in epilepsy-related disparities, such as in social or developmental outcomes and educational attainment. Healthcare providers should consider screening for sleep health among PWE, particularly for patients with cognitive complaints. Future work should longitudinally track sleep and memory and seek to develop treatment approaches that improve memory function and sleep in PWE.

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1151

TACTILE HALLUCINATIONS IN PEDIATRIC AND YOUNG ADULTS WITH NARCOLEPSY: A CASE SERIES AND REVIEW OF THE LITERATURE

Christine Palladino, Joel Willard, David Velez, Christian Suri Baez, Robin Varughese, Pavkovic Ivan, Sanjeev Kothare
Cohen Children's Medical Center- Northwell Health

Introduction: To characterize the presentation and management of tactile hallucinations in pediatric and young adult patients with narcolepsy and explore the relationship between fragmented sleep, pharmacologic therapy, and psychiatric comorbidities.

Methods: We describe four cases (ages 9, 11, 26, and 42) of persistent and distressing tactile hallucinations out of 55 narcolepsy patients seen at our institution. We reviewed clinical presentation, polysomnography (PSG), Multiple Sleep Latency Tests (MSLT), neuroimaging, and therapeutic responses.

Results: All patients exhibited excessive daytime sleepiness, and three had cataplexy. CSF orexin was low-normal in one patient. PSG and MSLT supported the diagnosis of narcolepsy in all cases. Besides visual hallucinations, all patients also had tactile hallucinations characterized by formication and paresthesia's and often exacerbated by sodium oxybate therapy. Fragmented nocturnal sleep was common and was associated with increased hallucination severity. In one case, hallucinations contributed to suicidal ideation requiring inpatient care. Hallucinations persisted despite pharmacological adjustments, although behavioral adaptations (e.g., wearing loose clothing) and psychotherapy helped one patient. Literature review links fragmented sleep to heightened hallucinatory experiences, especially tactile forms. Sodium Oxybates, while effective for cataplexy, visual hallucinations, and daytime sleepiness, may potentiate psychotic symptoms, including tactile hallucinations.

Conclusion: Tactile hallucinations in narcolepsy may represent an underrecognized and distressing symptom. Fragmented sleep, REM dysregulation, and pharmacologic side effects contribute to their emergence. Management requires a multidisciplinary approach integrating sleep medicine and psychiatry. Clinicians should consider hallucination profiles when titrating sodium oxybates and explore adjunctive therapies for symptomatic relief.

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1152

ASSOCIATION BETWEEN SLEEP QUALITY, REGIONAL AMYLOID UPTAKE, AND COGNITION

Anhithi Dharmapuri¹, Rachel McCray², Joshua Gills²,
Purbanka Pahari², Dominique Tanner², Anamarie Sogade²,
Hugh Wang³, Ray Razlighi³, Omonigho Bubu²¹NYU Langone Health, ²NYU Grossman School of Medicine,³Weill Cornell Medicine

Introduction: While previous research has established poor sleep quality as a risk factor for general cognitive decline in the elderly, its associations with regional amyloid uptake and specific cognitive domains remain understudied.

Methods: Participants (N= 221) were pulled from studies on sleep, aging and memory in cognitively normal community-dwelling older adults. Sleep quality was quantified using the Pittsburgh Sleep Quality Index (PSQI) and scores were categorized into Good Sleep (< 6), Moderately Poor Sleep (6-10), and Very Poor Sleep (>10). A neuropsychological battery containing tasks assessing various cognitive domains measured cognitive performance. Beta amyloid deposition was measured using PET imaging in regions of interest (ROIs). Multivariable regression models were run controlling for age, gender, race, education, and blood pressure.

Results: Participants were 68.1 ± 6.23 years old, 51% female, 53.7% Black/African American, and had 16.02 ± 2.67 years of education. Very poor (β [PSQI] = -1.15, [-2.283, -0.034], p = 0.04) and moderately poor (β [PSQI] = 2.01, [0.242, 3.788], p = 0.02) were associated

with verbal fluency. PSQI scores showed an inverse trend towards significance with global cognition measures (β [PSQI] = -0.14, [-0.300, 0.003], $p = 0.055$). Very poor PSQI scores showed significant relationships with amyloid deposition in the cingulate (β [PSQI] = 0.14, [0.024, 0.254], $p = 0.01$), temporal (β [PSQI] = 0.110, [0.007, 0.213], $p = 0.03$), parietal (β [PSQI] = 0.10, [0.003, 0.197], $p = 0.04$), and frontal (β [PSQI] = 0.12, [0.004, 0.243], $p = 0.04$) regions as well as in the medial orbitofrontal region (β [PSQI] = 0.15, [0.030, 0.278], $p = 0.01$), the posterior cingulate region (β [PSQI] = 0.13, [0.005, 0.266], $p = 0.04$) and the precuneus (β [PSQI] = 0.16, [0.035, 0.285], $p = 0.01$).

Conclusion: Participants with very poor PSQI scores exhibited significant increases in regional amyloid deposition and reduced verbal fluency and global cognitive scores, suggesting a need for further research into the interactive effects of amyloid uptake and sleep quality on cognitive performance.

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1153

ASSOCIATIONS BETWEEN DIM LIGHT MELATONIN ONSET AND SALIENCE NETWORK FUNCTIONAL CONNECTIVITY IN LATER-LIFE ADULTS

Connor Baggot¹, Meina Zhang², Karin Hoth³, Navya Spurthi Thatikonda³, Eric Axelson³, Vincent Magnotta³, Chooza Moon¹

¹University of Iowa, ²University of Texas Health Science Center at Houston, School of Public Health, ³University of Iowa Carver College of Medicine

Introduction: Disruptions in resting-state functional connectivity within the Salience Network (SN) and Default Mode Network (DMN), as well as their connectivity with the hippocampus, have been associated with cognitive decline and neurodegenerative disorders such as Alzheimer's disease and related dementias. As people age, circadian timing tends to advance, and sleep becomes increasingly fragmented and disrupted, which may also exacerbate cognitive decline and elevate the risk of neurodegenerative conditions. However, there is limited research examining the association between circadian rhythms and functional connectivity in aging. This study examined how circadian timing is associated with alterations in functional connectivity within the SN and DMN, as well as hippocampal connectivity to these networks.

Methods: We analyzed data from 50 cognitively healthy later-life adults (mean age $\pm$ SD = 68 ± 6.50 , female [$n = 25$ (52%)]). Dim light melatonin onset (DLMO) determined circadian timing. T1-weighted and BOLD images from 3.0T MRI data were collected. Correlation maps were generated by extracting the residual BOLD signal from the regions of interest (ROIs) and calculating Pearson correlation coefficients between that signal and the signals from all other voxels. These correlation values were then transformed into z-scores using Fisher's transformation.

Results: Later DLMO was associated with higher SN strength ($r = 0.37$, $p = 0.0079$). However, DLMO was not correlated with DMN strengths, hippocampal-DMN connectivity, or hippocampal-SN connectivity.

Conclusion: Later circadian timing was significantly associated with higher SN strength, suggesting that clinicians can identify individuals at increased risk of neuronal changes associated with circadian disruption. Future studies with a larger sample,

comprehensive covariates, and a prospective design are warranted to investigate this relationship further.

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1154

CORPUS CALLOSOTOMY DISRUPTS INTERHEMISPHERIC SPINDLE COHERENCE WITH STAGE-DEPENDENT MORPHOLOGICAL EFFECTS

Sahil Datta, Ryan Juncker, Jeffrey Gaither, Peter White, Jonathan Pindrik, Ammar Shaikhouni
Nationwide Children's Hospital

Introduction: Pediatric patients with drug-resistant epilepsy (DRE) suffer from frequent and dangerous seizure events. With limited treatment options available, neurosurgical teams often employ corpus callosotomy (CCS) for palliation. This study aimed to investigate the effect of CCS on sleep spindles, which play a key role in brain maturation, especially during critical developmental periods. We compare changes in sleep spindle coherence and morphology before and after CCS, focusing on the N2 and N3 sleep stages.

Methods: Sleep EEG recordings were obtained from seven patients before and after CCS at a sampling rate of 200 or 500 Hz using 24 electrodes. Automatic sleep staging and spindle detection were performed using the YASA library. Three spindle morphologies were compared before and after CCS: spindle amplitude, duration, and density. Spindle coherence was also evaluated in sleep stages N2 and N3 for three electrode pairs: F3-F4, P3-P4, and C3-C4.

Results: Six patients exhibited spindles in N2 and N3 separately. Spindle density decreased post CCS across N2, N3, and combined N2-N3, but the reductions were not significant. Spindle duration decreased post CCS in N2 (5 patients, $p < 0.05$), in N3 (4 patients, $p < 0.05$), and was significantly reduced for combined N2-N3 (5 patients, $p < 0.05$). Spindle amplitude increased in N3 post CCS (4 patients, $p < 0.05$), but no consistent effect was observed in N2, and combined N2-N3 amplitude showed no significant change. Spindle coherence showed a significant post CCS reduction across all sleep stages (all $p < 0.05$) and all electrode pairs.

Conclusion: Differences in both sleep spindle coherence and characteristics in pediatric patients post CCS are much more consistent in the N3 sleep stage as compared to N2. Notably, N3 spindles are thought to be driven and propagated through cortico-cortical pathways, which are much more likely to be affected by CCS than the thalamo-cortical dependent N2 spindles. These findings suggest the N3 sleep stage provides the ideal mechanism by which to evaluate inter-hemispheric coherence after CCS. Notably, N3 spindles are thought to be more tightly linked to memory consolidation, necessitating consideration of this effect on neurocognitive outcomes in the surgical decision making for DRE patients.

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1155

DIAGNOSTIC TIMELINESS, FOLLOW-UP, AND TREATMENT PATTERNS IN NARCOLEPSY ACROSS A RURAL HEALTH SYSTEM: A 10-YEAR RETROSPECTIVE STUDY

Saniah Khan

Bassett Healthcare

Introduction: Narcolepsy is a chronic neurological disorder associated with significant impairment in daily functioning and quality of life. Despite established diagnostic criteria, the condition remains frequently underrecognized, with reported delays often exceeding 8–11 years. Patients commonly experience prolonged intervals between symptom onset, initial clinical evaluation, and completion of polysomnography (PSG) and multiple sleep latency testing (MSLT). Symptoms are frequently attributed to alternative conditions such as depression, anxiety, ADHD, insomnia, or obstructive sleep apnea, contributing to further delay. Untimely diagnosis is linked to increased psychiatric burden, inappropriate treatments, and reduced quality of life. Although guidelines recommend follow-up every 6–12 months and regular assessment of daytime sleepiness, adherence varies widely. Rural populations may face additional barriers to specialty care, diagnostic testing, and medication access, yet these challenges are not well characterized. We aimed to evaluate diagnostic pathways, follow-up patterns, and treatment practices for narcolepsy within a large rural health system.

Methods: We conducted a retrospective cohort study within the Bassett Healthcare Network, a geographically expansive rural health system in upstate New York. Using the electronic medical record (EMR), we identified all patients with a documented narcolepsy diagnosis from January 2016 to December 2025. Eligible patients had a diagnosis confirmed by a sleep specialist or neurologist and at least one clinical encounter. Patients with reclassified diagnoses or insufficient documentation were excluded. Extracted variables included demographics; narcolepsy type; diagnostic intervals (symptom onset → diagnosis; first clinician visit → diagnosis); completion of PSG and MSLT; prior misdiagnoses; follow-up frequency; treatment initiation; pharmacotherapies used; polypharmacy; and Epworth Sleepiness Scale (ESS) scores at baseline and follow-up. Primary outcomes included diagnostic timeliness, adherence to ICSD-3 testing criteria, annual follow-up rates, and treatment patterns.

Results: Data abstraction and analysis are ongoing. Planned outcomes include distributions of narcolepsy subtypes, diagnostic delays, frequency of misdiagnoses, adherence to diagnostic testing, treatment selection trends, follow-up rates, and changes in ESS scores, including in oxybate-treated patients.

Conclusion: This study will provide the first detailed evaluation of diagnostic accuracy, follow-up patterns, and treatment practices for narcolepsy in a rural U.S. health system. Findings will inform quality-improvement strategies to reduce diagnostic delay and optimize care delivery in resource-limited settings.

Support (if any): No.

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1156

EVALUATING SLEEP AND ASSOCIATED COMORBIDITIES IN 5-18-YEAR-OLDS WITH PHARMACO-RESPONSIVE NON-LESIONAL EPILEPSIES: A PROSPECTIVE OBSERVATIONAL STUDY

Deepthi Krishna¹, Biswaroop Chakrabarty², Sheffali Gulati¹, Prashant Jauhari¹, Kanaram Jat¹, Kapil Sikka¹, Pratap Sharan¹, Atin Kumar¹, Maroof Khan¹

¹AIIMS, New Delhi, ²AIIMS, New Delhi 29, India

Introduction: Pharmacoresponsive non-lesional epilepsies (normal MRI Brain epilepsy protocol) constitute approximately 50% of childhood and adolescent epilepsies represented by primary generalised epilepsies and focal epilepsies with centrottemporal/occipital/frontal/temporal focus. Studies have shown sleep as a modifier of epilepsy and associated cognition and behaviour, more so in drug refractory epilepsies and epileptic encephalopathies. This literature is scanty in pharmacoresponsive non-lesional epilepsies. The current study characterised sleep architecture and evaluated cognition, behaviour and quality of life, pre and post standard-of-care for those with sleep disorders in 5-18-year-olds with pharmacoresponsive non-lesional epilepsies.

Methods: Cases were enrolled at a north Indian tertiary care teaching hospital if they were seizure free for at least 12 months and had a baseline intelligence quotient (IQ) >70. All the cases underwent detailed clinical evaluation and overnight polysomnography (PSG). Those with sleep disorders received standard-of-care and were reevaluated with overnight PSG after 6 months. They underwent Wechsler's intelligence scale for children-IV (WISC-IV), Child Behaviour Checklist (CBCL), and Peds QL (Pediatric Quality of life generic scales) evaluation pre and post standard-of-care.

Results: Forty-nine cases (mean age 11.5 ± 2.5 years; 53.06% male; 26/49 generalized, 23/49 focal epilepsy) were enrolled. Commonest generalised and focal epilepsies were generalised-tonic-clonic-seizures alone and temporal lobe epilepsy respectively. Sleep disorders were identified in 59.18% (29/49, 15 generalised and 14 focal), most commonly periodic limb movement disorder (48.98%) and obstructive sleep apnea (30.61%). Behavioural comorbidities were seen in 24.5% (10/49, majority attention deficit hyperactivity disorder, all had sleep disorders) and specific learning disability was seen in 20.4% (10/49, 9 had sleep disorders). After six months of standard of care in those with sleep disorders and associated comorbidities (n=29), - Overnight PSG showed improved sleep efficiency (p=0.031) and REM sleep (p=0.004), - WISC-IV and CBCL showed improved full-scale IQ (p=0) and total scores (p=0.04) respectively, and - Peds QL showed improvement in physical, emotional, social and school functioning (p<=0.01).

Conclusion: Despite adequate seizure control, sleep disorders are common in these epilepsies and are associated with other behavioural and scholastic comorbidities. Managing sleep and other comorbidities leads to improvement in sleep, associated comorbidities, and overall quality of life.

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1157

INSOMNIA PHENOTYPING AND MIGRAINE: A GENERAL POPULATION STUDYSlobodanka Pejovic¹, Nikolaos Athanasiou¹, Angeliki Vgontzas², Julio Fernandez-Mendoza³, Yun Li⁴, Edward Bixler¹, Alexandros Vgontzas¹¹Penn State College of Medicine, ²Harvard Medical School, ³Penn State University, Hershey, ⁴Shantou University Medical College

Introduction: Migraine is a lifelong disorder characterized by disabling headache attacks that affects about 1 billion people worldwide. Previous findings in clinical cohorts and population-based studies report that insomnia is associated with migraine. However, there are no studies on the association between migraine and insomnia in general population samples that include polysomnography. The aim of this study is to investigate whether insomnia phenotypes are associated with an increased risk of migraine in a large random general population sample.

Methods: A total of 1741 participants from a random sample of the Penn State Adult Cohort (52.3% women, aged 48.79± 13.56) underwent 8-hour polysomnographic evaluation. Migraine status was defined by the participant's response to "Have you ever had migraine headaches?", insomnia was defined by the presence of chronic insomnia lasting ≥ 1 year or complaints of difficulty falling asleep, staying asleep, nonrestorative sleep, or early morning awakening. Normal sleepers were defined by the absence of insomnia or OSA. Objective short sleep duration (SSD) was defined as < 6 hours sleep based on polysomnography. Binary logistic regression was performed controlling for age, sex, race, BMI, mental health problems, i.e., depression/anxiety, years of education, smoking, alcohol consumption, caffeine use and sampling weight.

Results: The prevalence of migraine was 13.5%. Compared to normal sleepers, insomnia but not OSA was associated with significant risk for migraine (OR=1.47, 95%CI=1.69-2.02, p=0.018; OR:1.11, 95%CI=0.60-2.05, p=0.722, respectively). Further analysis showed that, the insomnia normal sleep duration (INSD) phenotype but not insomnia short sleep duration phenotype (ISSD) was associated with significant risk for migraine compared to normal sleepers with normal sleep duration (OR=1.60, 95%CI=1.07-2.35, p=0.02).

Conclusion: Our data suggest that migraine is associated with the INSD phenotype. These findings are consistent with previous reports that INSD phenotype is associated with higher levels of depression and anxiety compared to ISSD. These differences further validate the concept of phenotyping of insomnia based on objective sleep duration with therapeutic implications i.e., INSD associated with migraine may respond better to behavioral treatments than medication.

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1158

MORNING HEADACHE, APNEA AND EARLY MORNING AROUSALAygun Asgarli¹, Linder Wendt², Elena Muro-Fuentes¹, Courtney Sullivan¹, Delora Denney³, Andrew russo¹, Deema Fattal⁴¹University of Iowa, ²Institute for Clinical and Translational Science, University of Iowa, ³University of Colorado, ⁴Carver College of Medicine, University of Iowa

Introduction: Morning headache (MH), a headache that occurs upon waking, affects ~10% of the population. Despite its prevalence, its cause(s) remain speculative. Previously, we found that in 383 Veterans MH was not associated with the presence of obstructive sleep apnea (OSA) or its severity, nor multiple other sleep parameters; sleep efficiency and total sleep time were non-significantly higher in those with MH. Therefore, we investigated MH with more detailed sleep parameters, including early morning arousal.

Methods: Participants aged 18–89, who visited the University of Iowa for a polysomnogram, and who consented to our study, completed a survey about headaches the morning after their polysomnogram. We collected sleep parameters from their polysomnogram.

Results: Of 100 enrolled participants, 89 did not have a headache at bedtime the night of their polysomnogram. Of those 89, 18 (20%) reported MH upon waking the next morning. There were no significant differences between those with MH (MH) and those without (non-MH) regarding the presence of OSA or OSA severity; lowest oxygen saturation; %REM sleep; presence of vivid dreams; presence of RSWA, WASO, PLMI, PLMAI, or SAI; or arousal past 4:00 AM. Moreover, 6% of MH and 21% of non-MH had prolonged arousal past 4:00 AM (p=0.2). Only 26 of 89 reported whether they woke up at night and went back to sleep; of those 26, 80% of MH and 100% of non-MH did. Sleep efficiency was non-significantly higher in MH vs non-MH (89% and 82%, respectively, p=0.12). A significant finding was that MH slept a bit longer than non-MH the night of the polysomnogram (median 6.4 vs 6.0 hours; p=0.03). Other significant findings were that 33% of MH and 6% of non-MH complained of teeth grinding that night (p=0.004), and 56% of MH and 24% of non-MH complained of teeth grinding at home (p=0.01).

Conclusion: • Consistent with our prior study, there were no positive associations between MH and OSA or OSA severity, nor multiple sleep parameters. Sleep efficiency was non-significantly higher in MH. • Novel parameters of early morning arousal were not associated with MH. • Teeth grinding and slightly longer sleep time were associated with MH.

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1159

OBJECTIVE-SUBJECTIVE DISCREPANCY IN SLEEP ASSESSMENT IN OSA PATIENTS WITH A HISTORY OF MIGRAINELorcan Doull, Boris Dubrovsky, Jeremy Weingarten, John Cunningham²

New York-Presbyterian Brooklyn Methodist Hospital

Introduction: A consistent relationship between chronic pain and poor sleep is found in numerous studies using self-reports, e.g., PSQI and ISI. However, PSG data are less consistent. Further, insomnia is associated with discrepancies between objective and subjective sleep measures. This analysis focuses on objective-subjective mismatch in migraine, a pain condition recently reported to have a stronger association with subjective sleep disturbance.

Methods: From 2001 adults undergoing consecutive clinical PSGs, 47 migraineurs (41 women, 20 Caucasian, M[Age]=46.5±12.4) were selected who were free from major medical and psychiatric conditions other than depression/anxiety (n=13) and

other types of non-cancer chronic pain ($n=18$). Mismatch indices ($MI=[\text{objective-subjective}]/\text{objective}$) between PSG and PSQI were calculated for total sleep time (TST), sleep latency (SL) and sleep efficiency (SE). MIs between PSG and subjective post-PSG estimates (PPE) were calculated for TST, SL and WASO. Each MI was regressed on PSG variables—TST, SL, SE, N1%, N3%, REM%, REM latency, WASO, #awakenings, total arousal index (TAI), AHI, SpO2nadir—and self-reported measures—chronic pain intensity (CPI), PSQI, ISI, ESS, Center for Epidemiologic Studies Depression Scale-Revised (CESDR). Age, sex, BMI, other pain and depression/anxiety diagnoses were used as covariates.

Results: Regressions for PSG-PSQI MIs revealed significant associations for TST and SE only. Greater underestimation of TST was related to higher REM% ($p=0.019$), fewer awakenings ($p=0.050$), lower AHI ($p=0.015$), lower SpO2nadir ($p=0.005$), higher PSQI ($p=0.001$). Greater underestimation of SE was related to lower N1% ($p=0.046$), fewer awakenings ($p=0.050$), higher TAI ($p=0.038$), lower AHI ($p=0.009$), lower SpO2nadir ($p=0.003$), lower CPI ($p=0.037$), higher PSQI ($p<0.001$). PSG-PPE MIs showed no significant associations with explanatory variables.

Conclusion: Underestimations of TST and SE on PSQI vs. PSG were associated with better gross measures of objective sleep—higher REM%, lower N1%, fewer awakenings and lower AHI—which indicates misperception. However, associations with higher TAI and lower SpO2nadir suggest contributions of more subtle physiological variables to these underestimations. Consistent with prior data on misperception in insomnia, in this sample of migraineurs greater underestimations of TST and SE were related to higher PSQI, which cautions against face-value interpretations of self-reported sleep disturbance without objective measures.

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1160

SLEEP HEALTH AMONG PALESTINIAN CIVILIANS AMID ARMED CONFLICT

Bilal Irfan¹, Mohammed Al-Hasan², Abdulwhhab Abu Alamrain³, Hasan Hussein⁴, Majd Abu Alnour⁵, Tia Mehanna⁶, Christelle El Murr⁶, Zeina Al-Khalil⁶, Magda Lena El Dada⁶, Abdallah Abu Shammala⁷

¹University of Michigan, ²Princess Alexandra Hospital NHS Trust, ³Al-Aqsa Martyrs' Hospital, ⁴Harvard University, ⁵Horizons Academy, ⁶American University of Beirut, ⁷European Gaza Hospital

Introduction: Sleep is highly vulnerable to the cumulative stressors of displacement, bombardment, and economic collapse, yet there is little data describing civilian sleep health during protracted armed conflict. We quantified sleep quality and psychological well-being among Palestinian civilians living in Gaza and the West Bank during the February 2025 “ceasefire” phase.

Methods: We analyzed data from an online cross-sectional survey conducted 5–16 February 2025 among Palestinian civilians residing in the five Gaza governorates and major urban and peri-urban centers of the West Bank. The questionnaire included sociodemographic items, the Pittsburgh Sleep Quality Index (PSQI), WHO-5 Well-Being Index, Patient Health Questionnaire-9 (PHQ-9), and Post-Traumatic Growth Inventory–Short Form, alongside conflict-specific exposures (night-time noise from drones, gunfire, airstrikes; household crowding). Descriptive statistics summarized symptom burden. Mann–Whitney U and χ^2 /Fisher's

exact tests compared Gaza and West Bank respondents. Spearman correlations examined associations between environmental exposures and sleep/mental health scores.

Results: Among 284 respondents (mean age 25.3 years; 83% women), households in Gaza were more crowded than in the West Bank (mean 9.1 vs 5.1 persons). In Gaza, 99–100% reported nocturnal disturbance from gunfire, drones, and airstrikes; 54% had ≥ 1 family member and 87% ≥ 1 friend killed, compared with 86%, 5%, and 26%, respectively, in the West Bank (all $p<0.001$). Across the combined sample, 84% had PSQI >5 , 88% had WHO-5 <50 , and 83% had PHQ-9 >9 , indicating pervasive poor sleep, low well-being, and at least moderate depressive symptoms. Mean PSQI and PHQ-9 scores were higher, and WHO-5 scores lower, among Gaza than West Bank respondents (all $p<0.05$). PTGI scores indicated only modest post-traumatic growth (mean $\approx 25/40$) without regional differences.

Conclusion: During the February 2025 “ceasefire,” Palestinian civilians, particularly those in Gaza, experienced profoundly disturbed sleep and high depressive symptom burden amid near-universal exposure to bombardment-related stressors and bereavement. These findings showcase the need for conflict-sensitive sleep and mental-health services, systematic screening, and longitudinal monitoring for war-affected civilian populations.

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1161

SLEEP MATTERS: EFFECT OF HABITUAL SLEEP DURATION ON EPILEPSY OUTCOMES

Tyler Bare¹, Jad El Ahdab¹, Matheus Araujo², Sikawat Thanaviratananich², Delaney ryan², James Bena², Nancy Foldvary-Schaefer³

¹Cleveland Clinic Foundation, ²Cleveland Clinic, ³Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Sleep deprivation is a common seizure trigger in adults with epilepsy (AWE), but studies measuring the effects of total sleep duration on seizures are limited. We examined associations between habitual sleep duration (SD)/sleep disturbance and seizure frequency/severity.

Methods: We retrospectively analyzed seizure and sleep-related patient-reported outcomes in AWE who reported average nightly Sleep Duration (SD) over the past 4 weeks and completed the Liverpool Seizure Severity Scale (LSSS) during the same period. Seizure outcomes were derived from the LSSS 4-week seizure count and the LSSS total score. SD was modeled continuously and categorically ($<7h$, $7-9h$, $>9h$). Mixed-effects Poisson regression modeled seizure counts and log-linear mixed models with continuous scales, with adjustments for age, sex, and race.

Results: We analyzed 453 observations from 370 AWE (mean age 44.5 ± 15.1 yr; 55.1% female; 80.3% Caucasian). Median SD was 6.0 (IQR 5-8), median LSSS 4-week seizure count was 2.0 (IQR 1-6), and median LSSS total severity score was 47.5 (IQR 30-62.5). SD groups were $<7h$ ($n=269$, 59.4%), $7-9h$ ($n=147$, 32.5%), and $>9h$ ($n=37$, 8.2%); those sleeping $>9h$ were younger than $<7h$ and $7-9h$ sleepers (38.8 ± 13.7 vs 45.1 ± 13.6 and 45.9 ± 16.3 ; $p=0.027$). In the adjusted continuous model, SD was not associated with seizure frequency (RR 1.00, 95% CI 0.97-1.04; $p=0.96$). When analyzing seizure frequency categorically, adjusted mean seizure counts were 8.39 (4.04-17.46) for $<7h$, 9.42 (95% CI 4.50-19.70) for $7-9h$, and 13.30 (6.14-28.79) for $>9h$. Compared with $<7h$, seizure

frequency was similar in 7–9h (RR 1.12, 95% CI 0.91–1.38; $p=0.27$), but >9h sleepers had higher seizure frequency than < 7h (RR 1.58, 95% CI 1.14–2.20; $p=0.006$) and 7–9h (RR 1.41, 95% CI 1.03–1.93; $p=0.031$). LSSS total scores were not significantly associated with SD.

Conclusion: Relative to normal habitual SD, long sleep was associated with higher seizure frequency, while short sleepers had similar seizure counts. Seizure severity did not differ between SD groups. This is the largest investigation of SD and seizure outcomes in AWE. These results support expanding sleep education from avoiding sleep deprivation to also avoiding over-sleep as a modifiable strategy to improve seizure control.

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1162

THE INTERACTION BETWEEN REFRACTORY TEMPORAL LOBE EPILEPSY AND OBSTRUCTIVE SLEEP APNEA: BEYOND THE OBVIOUS

Maria-Cecilia Lopes¹, Marine Trentin², Gilberto Trentin², Debora Petrunaro-Migueis³

¹Child and Adolescent Affective Disorder Program (PRATA), Department and Institute of Psychiatry at University of Sao Paulo Medical School, Sao Paulo, Brazil, ²Graduate Program in Neurosciences, ICBS/UFRGS, ³Antonio Pedro University Hospital, Fluminense Federal University, Rio de Janeiro, Brazil

Introduction: Sleep-disordered breathing (SDB) is recognized as a relevant comorbidity in epilepsy. Individuals with partial epilepsy may reduce antiepileptic drug (AED) by decreasing seizure susceptibility through improved respiratory stability and reduced sleep fragmentation. Certain AEDs may worsen SDB, and the high prevalence of obstructive sleep apnea (OSA) reported in refractory epilepsy raises important questions regarding causality. Despite growing interest, the mechanisms linking Temporal Lobe Epilepsy (TLE) and SDB remain insufficiently defined. Sudden Unexpected Death in Epilepsy (SUDEP), a major cause of mortality in refractory epilepsy, may also have pathways with sleep-related respiratory dysfunction. We aim to examine the expression of SDB in patients with refractory TLE compared with a matched control group.

Methods: A cross-sectional study was conducted involving adult patients with refractory TLE and a control group matched by sex and age. Participants were selected through a blinded clinical trial, including individuals who had been seizure-free for at least six months and all patients with confirmed refractory TLE. All subjects underwent neuroimaging and baseline polysomnography. Sleep disorder definitions and PSG scoring followed international standards.

Results: Twenty-four patients (11 women; mean age 33.8 ± 8.5 years) and 21 controls (9 women; mean age 26.1 ± 9.2 years) were included. Sleep disorders were identified in 41.7% of patients. Among them, SDB occurred in 29.2%, sleep-related movement disorders in 8.3%, and insomnia (sleep efficiency < 80%) in 8.3%. In the control group, SDB was observed in 14.3% and reduced sleep efficiency in 4.8%. Patients with refractory TLE had approximately 2.5 times higher odds of SDB compared with controls; however, the wide confidence interval crossing 1 indicates lack of statistical significance with the current sample size (Fisher's exact test, $p = 0.30$; OR 2.47; 95% CI 0.55–11.14).

Conclusion: These findings underscore the relevance of assessing and treating SDB in epilepsy care. Patients with refractory TLE demonstrated a greater burden of sleep disturbances, including

high but not statistically significant prevalence of SDB. Respiratory instability during sleep may influence the clinical trajectory of TLE through reciprocal interactions with epileptic activity. Early management of sleep disorders may assist in seizure control, improve quality of life, and potentially mitigate SUDEP risk.

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1163

ASSOCIATIONS OF EXCESSIVE DAYTIME SLEEPINESS WITH DOMAIN-SPECIFIC COGNITIVE FUNCTION IN COMMUNITY-DWELLING OLDER ADULTS

Rachel McCray¹, Anhiti Dharmapuri², Joshua Gills¹, Hugh Wang³, Ray Razlighi³, Omonigho Bubu¹

¹NYU Grossman School of Medicine, ²NYU Langone Health, ³Weill Cornell Medicine

Introduction: Excessive Daytime Sleepiness (EDS) is a common symptom in older adults with disturbed sleep and sleep disorders such as Obstructive Sleep Apnea. Research has identified EDS as an early risk factor for cognitive decline. However, little research has demonstrated EDS associations with specific cognitive domains. We examined the relationship between EDS and cognitive performance in community-dwelling older adults.

Methods: This cohort included 261 community-dwelling cognitively normal older adults pulled from NYU Grossman School of Medicine and Weill Cornell Medicine studies on sleep, aging, and memory. EDS was characterized by the Epworth Sleepiness Scale (ESS), and cognitive performance was measured using neuropsychological tasks assessing episodic memory and verbal fluency, among other cognitive domains. Multivariable linear regression models were run, controlling for age, gender, race, education, and blood pressure.

Results: On average, participants were 68.1 ± 6.23 years of age, 51% female, 53.7% Black/African American, and had 16.02 ± 2.67 years of education. ESS had a significant effect on performance in the episodic memory; [verbatim and paraphrase] $\beta[ESS] = -0.15, [-0.31, -0.0005]$, $p=0.049$; $\beta[ESS] = -0.15, [-0.30, -0.0008]$, $p=0.049$, and category fluency domains; $\beta[ESS] = -0.16, [-0.31, -0.02]$, $p=0.026$.

Conclusion: In this community-based cohort of cognitively normal older adults, higher levels of excessive daytime sleepiness were associated with poorer performance in episodic memory and verbal fluency. These findings suggest that EDS may reflect early vulnerability in specific cognitive domains and highlight the importance of assessing daytime sleepiness as a potential marker of cognitive risk in aging populations.

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1164

CORRELATION OF STRUCTURAL BRAIN IMAGING AND SPECTRAL SLEEP FRAGMENTATION IN A LARGE POLYSOMNOGRAPHY COHORT

Erhan Bilal¹, Matheus Araujo², Kristen Beck¹, Samer Ghosn³, Reena Mehra⁴, Carl Saab³, Jeff Rogers¹, Nancy Foldvary-Schaefer⁵

¹International Business Machines (IBM), ²Cleveland Clinic, ³Cleveland Clinic Foundation, ⁴University of Washington, ⁵Sleep Disorders Center, Neurological Institute, Cleveland Clinic

Introduction: Sleep physiology and brain health are deeply interconnected. Fragmented sleep has been implicated in cognitive decline, neuroinflammation, and hippocampal vulnerability. However, studies linking quantitative structural MRI to polysomnography (PSG) metrics remain limited. We leveraged a PSG foundation model and a novel measure of spectral sleep fragmentation (SSF) to test whether PSG-derived measures are associated with MRI markers of neurodegeneration.

Methods: We fine-tuned a foundation model on 10,000 clinical PSG recordings from the Cleveland Clinic (Jan 2012 to Dec 2022). Latent embeddings were aggregated at the patient level and clustered using k-means to define five previously validated PSG risk-groups (RG1-RG5) associated with distinct clinical outcomes. The SSF metric, a frequency-domain metric computed from the spectral representation of the sleep hypnogram, emerged as the most discriminative feature for separating clusters after age. To investigate structural brain correlates, we identified patients with clinical brain MRI analyzed using the automatic software NeuroQuant, which provides structured volumetric measures of hippocampal and ventricular anatomy. We constructed a composite neurodegeneration index (CNI) by combining hippocampal and inferior-lateral ventricular percentiles into z-scores, with higher values indicating greater neurodegenerative change. After filtering for subjects with valid SSF, risk-group assignment, and MRI data, we computed Pearson correlations between SSF and the composite index overall and within each risk group.

Results: We analyzed 271 MRI reports (Age: 65.7 ± 11.9 , Male: 51.4%, BMI: 29.8 ± 6.7). In the overall sample, higher SSF was modestly associated with greater neurodegenerative change ($n=271$, $r=0.19$, $p=0.002$). Stratified analyses per group revealed heterogeneous associations between SSF and CNI across risk-groups. Correlations were small and not significant in RG1-RG4 (RG1: $n=89$, $r=0.17$, $p=0.10$; RG2: $n=40$, $r=0.15$, $p=0.35$; RG3: $n=89$, $r=0.12$, $p=0.24$; RG4: $n=39$, $r=0.02$, $p=0.90$). In contrast, RG5, the highest-risk phenotype, showed a strong positive association between SSF and the neurodegeneration index ($n=14$, $r=0.67$, $p=0.009$), indicating that greater sleep fragmentation in this group tracked with more pronounced hippocampal-ventricular structural changes.

Conclusion: Spectral sleep fragmentation was associated with a composite index of hippocampal atrophy and ventricular enlargement, with the strongest relationship observed in the highest-risk PSG phenotype. These findings suggest that sleep fragmentation may serve as a relevant marker of neurodegenerative vulnerability, particularly among patients at the highest risk of adverse clinical outcomes.

Support (if any):

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1165

INSULIN RESISTANCE MODERATES REM, BUT NOT NREM, SLEEP STAGE DURATIONS AND EPISODIC MEMORY PERFORMANCE AMONG OLDER BLACK AMERICAN ADULTS

Gabrielle Belony¹, Brittany Larsen², Zihao Wang¹, Chloe Martin³, Debbie Chung², Georges J. Casimir⁴, Girardin Jean-Louis²

¹University of Miami Miller School of Medicine, ²University of Miami, ³Department of Social Sciences, School of Liberal Arts & Sciences State University of New York, ⁴SUNY Downstate Medical Center - Department of Psychiatry

Introduction: Sleep architecture - comprising rapid eye movement (REM) sleep, light sleep (N1/N2), and slow-wave sleep (SWS) - is essential for metabolic regulation and memory consolidation. Sleep disturbances adversely affect insulin resistance (IR), which can lead to hippocampal impairment. Therefore, disturbed sleep and metabolic dysfunction, together, may negatively influence episodic memory. This relationship needs further elucidation among Black Americans, who experience disproportionately higher sleep disruption, IR, and cognitive decline, likely due to increased psychosocial/environmental stressors relative to non-Blacks. This study examined whether associations between sleep architecture and episodic memory performance differed by IR levels in a sample of older Black adults.

Methods: Black adults ($N=83$) ages ≥ 55 years (mean age 61.8 ± 5.2 , 71.1% female) residing in South Florida (Monroe, Miami-Dade, Broward, and Palm Beach counties), were drawn from NIH-funded studies (MOSAIC, $n=51$; PRAISE, $n=32$), yielding baseline demographic and clinical data for the proposed analyses. Participants completed a medical history questionnaire, provided blood samples, wore a Fitbit (Inspire 2) device that captured sleep stage durations. All sleep data were averaged, providing one data point for each sleep metric. IR was assessed using fasting glucose and insulin to calculate HOMA-IR [$(\text{glucose (mg/dL)} \times \text{insulin (U/mL)})/405$]. Episodic memory was measured using the NIH Toolbox Picture Sequence Memory Test, where age- and education-adjusted T-scores were derived. We used moderation regression analysis to determine whether insulin resistance moderated associations between total sleep duration or sleep stage durations and episodic memory.

Results: HOMA-IR significantly moderated the relationship between REM duration and episodic memory performance ($\Delta R^2=0.11$, $\Delta F=9.75$, $p=0.0025$), controlling for sex and diabetes diagnosis. Among insulin-sensitive participants, greater REM duration predicted better episodic memory. Whereas higher insulin resistance was associated with poorer memory performance as REM duration increased. Moderation regression analysis found no significant associations between light sleep, SWS, or total sleep duration and episodic memory.

Conclusion: Findings indicate that insulin resistance modifies REM sleep and episodic memory interactions among older Black adults. Future studies should investigate metabolic health as a pathway linking sleep architecture to cognition and inform interventions targeting both sleep and metabolic risk. Longitudinal research may clarify how improving these factors could influence cognitive aging.

Support (if any):

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1166

SURGICAL TREATMENT FOR OBSTRUCTIVE SLEEP APNEA AND COGNITION IN POSTMENOPAUSAL WOMEN: A MULTICOHORT ANALYSIS

Elaine Costa¹, Pedro Oliveira², Jananee Muralidharan³, Thomas Young², Honor Magon³, Carlos Bolanos³, Robson Capasso¹

¹Stanford University, ²Stanford University School of Medicine, ³Atropos Health Inc.

Introduction: Obstructive sleep apnea (OSA) affects 1 billion people and, with aging, increases cognitive impairment risk. Few studies assess postmenopausal women after surgery. This study

evaluates whether OSA surgery alters cognitive impairment risk versus non-surgical therapy in postmenopausal women.

Methods: Retrospective cohort using Atropos Health's Evidence Network de-identified US datasets (Apollo and Fortuna). Eligible: women ≥ 40 years-old with incident OSA (≥ 2 ICD codes and a sleep test CPT code), BMI < 35 kg/m² in the prior year, and no prior investigated treatments or outcomes. The intervention group underwent surgery (partial glossectomy, palatopharyngoplasty, tonsillectomy, hypoglossal nerve stimulation) within 2 years of diagnosis; the non-surgical group received continuous positive airway pressure prescription. Follow-up began at therapy initiation. A Cox proportional hazards model estimated HRs (95% CIs) and restricted mean survival times (RMSTs) analysis were performed by treatment for cognitive impairment, memory loss, neurocognitive disorder, Alzheimer's, vascular, Lewy body, frontotemporal, and other/unspecified dementia. Propensity score matching (PSM) balanced baseline covariates.

Results: Fortuna dataset: surgical n=2,896 versus non-surgical n=100,000; mean (SD) follow-up 1196.8 (758.9) versus 1487.6 (732.8) days; mean (SD) age 57.7 (10.7) versus 58.9 (10.3) years. No neurocognitive outcome differed between arms in unadjusted or PSM analyses. PSM HRs (95% CI): Alzheimer's 0.44 (0.14–1.40), cognitive impairment 0.93 (0.57–1.52), neurocognitive disorder 0.73 (0.47–1.15), unspecified dementia 1.18 (0.65–2.14), vascular dementia 1.12 (0.23–5.54), composite 1.03 (0.82–1.29). Memory loss was slightly elevated in unmatched models but disappeared after adjustment (1.00, 0.76–1.32). Apollo dataset: non-surgical n=32,517 (mean[SD] age 63.7 [10.4]) versus surgical n=524 (60.6 [11]). BMI was available and balanced: 29.0 (3.6) vs 28.6 (3.5) kg/m². Follow-up 1592.9 (1010.9) versus 1093.0 (871.3) days. Results were similar to those previously described. Events were rare and HRs ~ 1.00 , without significant differences in neurocognitive outcomes. RMSTs were nearly identical across groups for both cohorts.

Conclusion: Neurocognitive outcomes in postmenopausal women with OSA were equivalent among surgical and non-surgical strategies over a five-year horizon across two national cohorts. Findings should be interpreted with caution given the low event rates, and prospective studies with an older population and longer follow-up are needed to validate these initial findings.

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1167

NOVEL MEDICATIONS TO OPTIMIZE SLEEP IN NEURODEVELOPMENTAL DISORDERS

Muhammad Usama¹, Alyson Janda², Christina Wombles³, Holly Skinner³, Temitayo Oyegbile-Chidi²

¹King Edward Medical University, ²UC Davis, ³AdventHealth Orlando

Introduction: Sleep initiation and maintenance difficulties are highly prevalent in individuals with neurodevelopmental disorders (NDDs) and contribute to impaired daytime functioning, behavioral dysregulation, caregiver sleep loss, and reduced quality of life. Sleep disruption may exacerbate neurobiological dysfunction through alteration of neurotransmitter systems and inflammatory pathways. Despite the clinical significance, commonly used sleep agents—such as melatonin, clonidine, gabapentin, and trazodone—are often ineffective in this population, and evidence supporting newer sleep medications in NDDs remains sparse.

Methods: A prospective evaluation was conducted for 2 clinic patients with documented NDDs and chronic sleep impairment who were treated with newer sleep-targeting therapies. The Children's Sleep Habits Questionnaire (CSHQ) was used to quantify changes in sleep quality.

Results: Case 1: A 24-year-old male with Dravet syndrome (SCN1A mutation) developed profound insomnia following an ICU hospitalization requiring dexmedetomidine. He slept only 4 hours nightly, with frequent awakenings that required constant parental monitoring. Trials of melatonin and zolpidem were ineffective. Initiation of daridorexant 50 mg nightly resulted in near-complete resolution of nocturnal awakenings and increased sleep to 10 hours nightly. His CSHQ score improved from 75 to 34, allowing parents to resume typical nighttime routines. After 3 months, he developed night terrors and the medication was tapered. Case 2: A 16-year-old female with Rett syndrome (MECP2 mutation) had lifelong severe sleep disruption characterized by night laughing, screaming, and terrors, which progressively strained family functioning. She failed melatonin, zolpidem, mirtazapine, eszopiclone, clonidine, clonazepam, and gabapentin. After initiation of trofinetide—titrated slowly due to GI effects—she began sleeping through the night within 4 weeks. Nightly sleep increased from 2 to 9 hours, and her CSHQ score improved from 85 to 49. Eszopiclone and clonidine were discontinued, and melatonin was reduced. Marked gains in daytime cognition, potty training, and school engagement were reported, with benefits sustained for over 6 months.

Conclusion: These cases illustrate the potential efficacy of novel therapies—dual orexin receptor antagonists and trofinetide—in treating refractory insomnia in individuals with NDDs. They underscore the need for systematic research on sleep pharmacotherapy in this population, including long-term safety and impact on cognitive, behavioral, and family outcomes.

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1168

QUANTIFYING NEUROLOGICAL AGING IN PARKINSON'S DISEASE USING MULTIDIMENSIONAL SLEEP EEG BIOMARKERS

Saar Lanir-Azaria

Tel Aviv University

Introduction: Sleep microstructure shows age-related decline, including alterations in sleep spindle characteristics and reduced slow wave activity, which reflect diminished synaptic integrity and increased cognitive vulnerability (Tsapanou et al., 2020). Sleep EEG models can estimate brain age, and deviations from chronological age predict inflammation, cognitive impairment, and dementia risk (Miao et al., 2025; Sun et al., 2019, 2025). Parkinson's disease is marked by pronounced sleep pathology, including elevated REM sleep without atonia and abnormal REM theta activity, both linked to neurodegeneration and cognitive decline (Galbiati et al., 2018; Iranzo et al., 2010). This study aims to integrate sleep microstructure features into a unified Neurological Age Index (NAI) and evaluate its association with cognitive and clinical measures as an indicator of neurological aging.

Methods: The cohort included individuals with drug naïve Parkinson's disease and age matched healthy controls who completed overnight laboratory polysomnography with high density EEG. Clinical measures included Hoehn and Yahr staging,

UPDRS III motor scores, MoCA, and a motor learning task. Sleep microstructure metrics were derived from standardized EEG pre-processing and included spindle characteristics, slow wave activity, spectral ratios, slow oscillation and spindle coupling, and the RSWA index. Associations between sleep physiology, cognitive performance, and clinical severity were evaluated using nonparametric correlations and integrated into a unified NAI for multivariate modeling.

Results: Preliminary analyses showed a disease specific coupling between sleep microstructure and clinical severity in Parkinson's disease. Elevated REM theta activity was the strongest marker, correlating with both Hoehn and Yahr stage ($r = 0.558$, $p = 0.005$) and UPDRS III scores ($r = 0.425$, $p = 0.038$). NREM spectral features showed additional but variable associations, while RSWA demonstrated modest relationships with disease stage. Additional features are being incorporated into the unified NAI model.

Conclusion: These findings suggest that specific elements of sleep microstructure provide sensitive markers of brain pathology. Integrating these features into a unified NAI may offer a novel physiological measure of neurodegeneration. This approach holds promise for improving early detection and tracking disease progression.

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1169

SLEEP APNEA RELATED HYPOXIC AND VENTILATORY BURDENS AND THEIR IMPACT ON GLOBAL COGNITIVE PERFORMANCE IN OLDER COMMUNITY DWELLING AMERICAN ADULTS

Purbanka Pahari¹, Joshua Gills¹, Elena Valkanova², Anhiti Dharmapuri³, Ankit Parekh⁴, David Rapoport⁵, Korey Kam⁴, Indu Ayappa⁵, Joanna Dominguez³, Ricardo Osorio¹, Omonigho Bubu¹

¹NYU Grossman School of Medicine, ²University of South Florida, ³NYU Langone Health, ⁴Icahn School of Medicine at Mount Sinai, ⁵David M. Rapoport Sleep Research Laboratory, Division of Pulmonary, Critical Care, and Sleep Medicine, Icahn School of Medicine at Mount Sinai

Introduction: Obstructive sleep apnea (OSA) is a common nocturnal breathing disorder characterized by frequent intermittent hypoxia and represents a significant public health concern. OSA severity, typically measured by the apnea-hypopnea index (AHI), has been linked to cognitive impairment and an increased risk of Alzheimer's disease. This study aimed to examine whether OSA-related physiological burdens, specifically hypoxic burden (HB) and ventilatory burden (VB), are associated with cognitive performance in community-dwelling older adults.

Methods: This study utilized data from a longitudinal cohort of 135 clinically cognitively normal (CDR=0) older adults (median age 65.9 years), comprising 37.8% white non-Hispanic and 56.3% black African American participants enrolled in the Sleep, Aging, and Brain Health study at NYU. Cognitive performance was assessed using the Uniform Dataset (UDS 3), a comprehensive neuropsychological battery measuring dementia severity (MoCA), verbal memory, visuospatial skills, attention, language category fluency, processing speed, and executive function. Total sleep

time (TST), VB, and HB were derived from overnight polysomnography at the Mount Sinai Integrated Sleep Center. Linear mixed-effects regression models evaluated associations between HB, VB, and cognitive performance, adjusting for age, sex, race, BMI, TST, and slow-wave activity.

Results: Participants had a median TST of 5.31 hours (Q1-Q3: 4.5–6.8) and a median BMI of 29.4 (Q1-Q3: 24.6–32.6). Higher HB and VB were associated with decreased performance on the MoCA (HB: $\beta = -0.179$, $p < 0.001$) and attention tasks (HB: $\beta = -0.102$; VB: $\beta = -0.761$, $p < 0.001$), and longer completion times for executive function tasks (HB: $\beta = 0.295$; VB: $\beta = 0.834$, $p < 0.001$). Conversely, elevated HB and VB were linked to improved language fluency (HB: $\beta = 0.163$; VB: $\beta = 0.569$, $p < 0.001$) and memory performance (HB: $\beta = 0.128$; VB: $\beta = 0.345$, $p < 0.001$). No significant associations were observed for visuospatial or processing speed tasks. Adjusted models revealed significant effects for males and non-Hispanic white participants.

Conclusion: In older community-dwelling adults, OSA-related hypoxic and ventilatory burdens are associated with reduced cognitive performance in domains of dementia severity, attention, and executive function. These findings underscore the potential impact of OSA on age-related cognitive decline.

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1170

PARENT-ADMINISTERED PEDIATRIC TUINA FOR SLEEP DISTURBANCE IN EARLY SCHOOL-AGED CHILDREN WITH ADHD: AN EXPLORATORY RANDOMIZED CONTROLLED TRIAL

Shucheng Chen, Wing-Fai Yeung
Hong Kong Polytechnic University

Introduction: Pediatric tuina is a traditional Chinese medicine (TCM) external complementary and alternative therapy. Parent-administered pediatric tuina (PPT) has shown promising clinical effects on sleep disturbance in children with attention-deficit/hyperactivity disorder (ADHD), but evidence remains limited in the school-aged population.

Methods: This three-arm exploratory randomized controlled trial evaluated the feasibility and preliminary effects of PPT for sleep disturbance in early school-aged children with ADHD. The study enrolled 61 parent-child dyads with children aged 6-8 years diagnosed with ADHD in Hong Kong from October 2023 to May 2024. Participants were randomized to PPT, parent-child interaction exercise (PIE), and routine care (RC) groups. The PPT intervention included 2 face-to-face training sessions where parents learned to practice prescribed pediatric tuina techniques for ADHD every 2 days for 8 weeks. Feasibility outcomes included recruitment, retention, and intervention adherence rates. The primary efficacy outcome was the Sleep Disturbance Scale for Children (SDSC). Secondary outcomes included Children's Eating Behaviour Questionnaire, Conners Parent Rating Scale, and Pediatric Quality of Life Inventory.

Results: A total of 61 parent-child dyads (mean [SD] parent age, 40.3 [3.4] years; 56 [91.8%] female parents; children: median age, 7.0 years; 44 [72.1%] male) were randomized to PPT ($n=22$), PIE

($n=20$), and RC ($n=19$) groups. The study demonstrated satisfactory feasibility with retention rate of 96.7% (59/61) and intervention adherence rate of 70% (14/20 completers with ≥ 24 sessions). Compared with RC, the PPT group showed significantly greater reduction in SDSC scores at both week 4 (MD = -10.50; 95% CI, -18.57 to -2.43; $d = -0.628$; $P = .011$) and week 8 (MD = -11.42; 95% CI, -19.53 to -3.30; $d = -0.687$; $P = .006$).

Conclusion: Findings demonstrate that PPT with parent training was feasible in ADHD family settings and significantly improved sleep disturbance among children with ADHD, while exploratory analyses indicated benefits for satiety responsiveness and behaviors. PPT showed comparable effects with PIE in improving ADHD symptoms and children's quality of life.

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1171

STUDY DESIGN AND RATIONALE FOR A PHASE-2 STUDY OF SAMELISANT (SUVN-G3031) FOR THE TREATMENT OF CATAPLEXY IN PATIENTS WITH TYPE 1 NARCOLEPSY

Pradeep Jayarajan, Vinod Kumar Goyal, Vijay Benade, Anil Shinde, Keerthi Sai Bitra, Renny Abraham, Abdul Rasheed Mohammed, Praveen Kumar Choudakari, Rajesh Kumar Badange, Ramakrishna Nirogi
Suven Life Sciences

Introduction: Samelissant (SUVN-G3031) is a potent and selective histamine-3 receptor inverse agonist designed to modulate the histaminergic system, a key regulator of the brain's sleep-wake cycle. Preclinical studies in narcolepsy-relevant animal models have shown that Samelissant produces significant antiepileptic and wake-promoting effects, supporting its potential as a therapeutic option for Type 1 narcolepsy (NT1).

Methods: Samelissant was evaluated in orexin-knockout mice and orexin-B saporin (SAP)-lesioned rats to assess its effects on cataplexy and sleep-wake regulation using electroencephalography (EEG). In orexin-knockout mice, Samelissant significantly reduced cataplexy-like episodes, and in orexin-B SAP-lesioned rats, it produced a significant decrease in direct wake-to-REM sleep (DREM) episodes. Based on these nonclinical findings, a Phase-2 proof-of-concept study is being planned to investigate Samelissant for the treatment of cataplexy in patients with NT1.

Results: This proposed study is a randomized, double-blind, placebo-controlled, parallel-group study will enroll approximately 129 patients with a confirmed diagnosis of Type 1 narcolepsy (NT1) according to ICSD-3-TR or DSM-5-TR criteria. Following a 4-week prescreening period, eligible participants will undergo a 3-week dose-titration phase, followed by 5 weeks of stable-dose treatment and 2-week follow-up period. The primary endpoint is the change from baseline in weekly cataplexy rate at Day 57. Secondary endpoints include changes from baseline in Clinical Global Impression-Severity (CGI-S), Epworth Sleepiness Scale (ESS) scores and evaluation of safety and tolerability. Exploratory endpoints include changes from baseline in Clinical Global Impression-Change (CGI-C), Patient Global Impression-Change (PGI-C), Narcolepsy Severity Scale (NSS), the EQ-5D-5L score and Sustained Attention to Response (SART) scores at Day 57.

Conclusion: Findings from animal models indicate that Samelissant may exert meaningful antiepileptic effects. The results of the planned Phase-2 study will inform the therapeutic potential of Samelissant for the treatment of cataplexy in patients with NT1.

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1172

TRAINING ARTIFICIAL INTELLIGENCE MODELS TO ASSESS INJURY RISK IN REM SLEEP BEHAVIOR DISORDER

Brinda Raval¹, Jeongyeon Hwang², Nicolas van Pesch³, Amene Gafsi³, Amelia Bertolaso³, Mohamed Abdelfattah³, Alexandre Alahi³, Matteo Cesari⁴, Ambra Stefani⁴, Emmanuel Doring²

¹Mount Sinai West, ²Icahn School of Medicine at Mount Sinai, ³École Polytechnique Fédérale de Lausanne, ⁴Medical University Innsbruck

Introduction: REM sleep behavior disorder (RBD) poses a high risk of injury to patients and bed partners, yet symptomatic treatments are limited and clinical trials lack objective, quantifiable endpoints. We evaluated whether AI-driven computer-vision models could automatically detect injury-risk behaviors in a large, well-characterized cohort of patients with isolated RBD undergoing video-polysomnography (vPSG).

Methods: Motor events during REM sleep were automatically detected by optical flow on vPSG from 69 subjects (79.4% male; mean age 66.4 years) with definitive RBD, and segmented in discrete movement clips separated by ≥ 1 second of immobility. All clips were manually rated by two independent reviewers using the International RBD Study Group scale classifying behaviors as mild (no risk), moderate (mild risk) or severe (significant risk of injury). A third reviewer adjudicated clips with discordant ratings (14.9% of clips). Given the relative rarity of moderate and severe events, these two categories were merged into a single "injury-risk" class. We used two model types to classify injury risk: (1) heuristic models based on 4 explainable features: magnitude, velocity, complexity (angular variation) of movements, and lateral displacement; (2) a deep visual model (V-JEPA) in which video frames were fed directly as input; adopting a 80/10/10% split for training, validation, and testing with severity-class distribution preserved across each set.

Results: A total of 3,329 movement clips were manually rated as mild, 265 clips as moderate, and 19 as severe (total of 284 injury-risk movements). Best performance was achieved with V-JEPA and a vision transformer model, with 93% accuracy and a macro F1 score of 0.81, while feature-based random forest achieved 85% accuracy and macro F1 of 0.64. Movements classified as injury-risk were associated with greater magnitude, velocity, complexity, and lateral displacement toward the edge of the bed. Model performance with environmental variations in camera setup, lighting conditions, and room configuration remained stable in the feature-based heuristics model but declined in the vision-only model.

Conclusion: This work illustrates the feasibility of using computer-vision models to automatically quantify RBD injury-risk. Future studies should evaluate the extent to which such models generalize to various clinical and home environments.

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1173

ASSOCIATION OF PERIPHERAL BLOOD NEUTROPHIL-LYMPHOCYTE RATIO WITH MOTOR AND COGNITIVE FUNCTION IN ISOLATED REM SLEEP BEHAVIOR DISORDER

Jin-Sun Jun¹, Ryul Kim²¹Kangnam Sacred Heart Hospital, Hallym university,²Department of Neurology, Seoul Metropolitan Government - Seoul National University Boramae Medical Center, Seoul National University College of Medicine

Introduction: Emerging evidence suggests that subtle immune alterations may precede the clinical onset of Parkinson's disease (PD). The neutrophil-lymphocyte ratio (NLR), a readily obtainable marker of systemic inflammation, has been proposed as a potential indicator of prodromal pathology. We investigated whether peripheral neutrophil and lymphocyte indices are altered in individuals with isolated REM sleep behavior disorder (iRBD), a well-established prodromal stage of α -synucleinopathy, and whether these markers relate to early motor or cognitive features.

Methods: We examined participants enrolled in the Parkinson's Progression Markers Initiative who met criteria for iRBD (n=116), and we compared them with age-matched healthy controls (n=284). Motor function was quantified using the MDS-UPDRS part III. Cognitive performance was evaluated across multiple domains using standardized neuropsychological assessments. Group differences in blood markers and their associations with clinical measures were analyzed with appropriate covariate adjustments and false discovery rate correction.

Results: Individuals with iRBD showed significantly lower lymphocyte counts compared with controls ($P < 0.001$), while neutrophil counts were comparable between groups ($P = 0.749$). Consequently, NLR values were elevated in iRBD ($P = 0.008$). Within the iRBD cohort, higher NLR—driven primarily by lower lymphocyte levels—was associated with greater motor impairment on the MDS-UPDRS part III after correction for multiple comparisons ($Q = 0.011$). This association was not influenced by additional prodromal features, and no significant relationships were observed between immune markers and cognitive test performance.

Conclusion: These findings suggest that immune dysregulation characterized by elevated NLR is detectable in iRBD and is related to subtle motor dysfunction before the emergence of overt PD. Whether lymphocyte-based inflammatory markers hold prognostic value for phenocconversion to Parkinson's disease warrants further longitudinal investigation.

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1174

ELECTROPHYSIOLOGICAL CORRELATES OF COGNITION IN REM SLEEP BEHAVIOR DISORDER: SELECTIVE SENSITIVITY TO NON-MEMORY DOMAINS

Minji Lee¹, In-Young Yoon², Jung Kyung Hong²¹Soonchunhyang University Seoul Hospital, ²Seoul National University Bundang Hospital

Introduction: Idiopathic REM sleep behavior disorder (iRBD) is a prodromal α -synucleinopathy often marked by cognitive decline. Quantitative EEG (QEEG) measures such as the theta/beta (TBR)

and theta/alpha ratios (TAR) have been suggested as noninvasive markers of early neurodegenerative change. This study investigated whether longitudinal changes in TBR and TAR predict early cognitive decline in iRBD.

Methods: Patients diagnosed with iRBD by video-polysomnography between 2016 and 2018 were followed for an average of 6.4 years and underwent repeated neuropsychological testing and QEEG. Cognitive stability was defined by z-score changes in the CERAD-K battery. Longitudinal changes in TBR and TAR were compared between cognitively stable and declined groups, with additional analyses for memory and non-memory domains.

Results: Of 87 eligible patients, 55 were included in the final analysis. The mean age was 65.9 years, and were 37 were men. Group-by-visit interactions were not significant for the overall cognition or the memory-domain. In contrast, significant interactions emerged exclusively in the non-memory domain, with effects observed for TBR across all lobes (all $p < 0.05$), and for TAR in the frontal, temporal, parietal, and occipital regions (all $p < 0.05$). In the non-memory domain, cognitively stable patients exhibited modest TBR increases in temporal, central, and parietal regions and TAR increases in central region, whereas cognitively declined patients demonstrated marked increases in both TBR and TAR across all lobes.

Conclusion: TBR and TAR, reflect longitudinal changes associated with non-memory cognitive decline in iRBD. These findings suggest that QEEG may serve as a promising biomarker for early neurodegenerative disease progression.

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1175

POST TRAUMATIC STRESS DISORDER ASSOCIATION WITH ELEVATED ELECTROMYOGRAPHIC ACTIVITY DURING RAPID EYE MOVEMENT SLEEP IN ACTIVE DUTY SERVICE MEMBERS

Grant Tays¹, Caddie Motoni², Amanda Studnicki¹, Angeliki Pollatou³, Bradford Clemens², Elizabeth Metzger⁴, J. Kent Werner³¹The Geneva Foundation, ²Uniformed Services University,³Walter Reed National Military Medical Center, ⁴The Geneva Foundation/Uniformed Services University

Introduction: PTSD affects up to 31% of US combat Veterans, impacting mental and physical health. PTSD commonly results in sleep disturbances; greater symptoms associate with poorer sleep, insomnia, and nightmares. Chronic sleep disturbances contribute to neurodegeneration, often preceded by dream enactment, or REM behavior disorder (RBD). RBD involves loss of REM paralysis, or REM sleep without atonia (RSWA), identified with electromyographic (EMG) activity and appearing with greater severity in Veterans with PTSD. Standardized human scoring is laborious and lacks granularity to identify subtle atonia differences across large populations. Novel algorithms enable detailed RSWA measurements at high resolution. We hypothesized we would identify RSWA differences in SMs with PTSD (PTSD+) versus those without (PTSD-) using an open-source algorithm, RBDtector, in standard polysomnograms.

Methods: We compared RSWA in 12 PTSD+ and PTSD- SMs at the Walter Reed Sleep Disorder Center. Following clinician graded sleep scoring, we used RBDtector to analyze EMG activity and sleep stages in the chin and tibialis anterior. In our initial analysis,

we used a one-way ANOVA to determine if RSWA is higher in PTSD+ SM's compared to PTSD-.

Results: PTSD+ SMs had significantly higher phasic (0.1 – 5.0s) bouts of chin EMG activity ($p < 0.001$). Further, there was increased EMG activity ($p = 0.003$) in PTSD+ SMs. Larger sample analysis is ongoing.

Conclusion: These preliminary results indicate that PTSD+ SMs exhibit greater symptoms of RSWA than PTSD- SMs. Further analysis towards our target sample size ($n = 100$ in each group) will support these preliminary findings. PTSD and RBD may share overlapping neuropathologic pathways, enhancing our understanding of PTSD treatment.

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1176

REM SLEEP IN PATIENTS WITH COMORBID FIBROMYALGIA AND OBSTRUCTIVE SLEEP APNEA VERSUS OSA ONLY PATIENTS

Abraham Alrefai¹, Anne Hutchinson¹, Aaron Perlow¹, Madelyn Chen¹, Udochi Okorie¹, Kevin Murphy¹, Khoi Huynh¹, Mariana Perepitchka¹, Adam Hyde², Edwin Meresh²

¹Loyola University Chicago Stritch School of Medicine,

²Department of Psychiatry, Loyola University Medical Center

Introduction: In Obstructive Sleep Apnea (OSA) patients, treatment with continuous positive airway pressure (CPAP) increases rapid eye movement (REM) sleep, highlighting the potential for sleep restoration. Fibromyalgia (FM) is a chronic pain condition often co-occurring with OSA and associated with sleep disturbances. REM sleep plays a key role in pain modulation, and REM deprivation has been linked to increased pain sensitivity, a core symptom of FM. In healthy adults, REM comprises ~25% of total sleep time, and reduced REM may alter pain perception. We hypothesize that patients with comorbid OSA and FM will exhibit reduced REM sleep compared to OSA alone, suggesting a mechanism by which FM may exacerbate pain and sleep-related symptoms in this population.

Methods: This IRB-approved retrospective chart review identified patients with FM and OSA through EPIC using diagnostic codes (ICD 10: M79.7, G47.33; ICD-9: 729.1, 327.23). FM+OSA patients were collected from 2012–2018 and OSA-only patients from 2019–2024. Polysomnography reports were reviewed for REM latency, REM duration, and REM percentage of total sleep time (TST) using supercomputer analysis. weight and BMI were collected from EPIC demographics.

Results: A total of 433 patients with FM+OSA and 250 patients with OSA only were included. The FM+OSA group was predominantly female (379/433). Average REM duration was 39.3 minutes in the FM+OSA group versus 45.5 minutes in the OSA-only group, a 6.2-minute difference ($p < 0.01$). REM percentage of TST was

12.6% in FM+OSA versus 14.4% in the OSA only group, reaching marginal statistical significance (Fisher exact test statistic = 0.0969, $p < 0.10$).

Conclusion: Both OSA and FM+OSA patients exhibited reduced REM sleep compared to population norms, with FM contributing an additional reduction in REM sleep, both in absolute minutes and as a percentage of total sleep time. This greater REM loss in FM+OSA supports the hypothesis that altered REM sleep may explain the heightened pain burden in FM. Prospective studies are needed to determine whether reduced REM directly influences pain perception in FM and whether interventions that restore REM sleep can mitigate pain.

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1177

REM SLEEP BEHAVIOR DISORDER BEYOND SYNUCLEINOPATHY: CLINICAL DIVERSITY ACROSS ETIOLOGICAL SUBTYPES

Giuseppe Lanza¹, Rita Bella², Angelo Garifoli¹, Bartolo Lanuzza¹, Maria Mogavero¹, Manuela Morreale¹, Aurora Palmigiano², Giovanni Pastorello¹, Manuela Pennisi², Angelica Quercia¹, Mariangela Tripodi¹, Raffaele Ferri¹

¹Oasi Research Institute, ²University of Catania

Introduction: REM sleep behavior disorder (RBD) is classically considered a prodromal marker of α -synucleinopathies, yet it also occurs in association with other neurological disorders and with antidepressant use. Whether these forms represent clinically and biologically distinct entities remains insufficiently explored. This study aimed to compare multidimensional clinical profiles of idiopathic, antidepressant-associated, and tauopathy-associated RBD.

Methods: We retrospectively reviewed clinical and video-polysomnographic data of patients hospitalized between 2018 and 2023 with polysomnography-confirmed RBD, excluding individuals with Parkinson's disease, dementia with Lewy bodies, or multiple system atrophy. Patients were classified as idiopathic RBD (iRBD), antidepressant-associated RBD, or tauopathy-associated RBD. Demographic variables, disease duration, sleep-related comorbidities, cognitive status (including Mini-Mental State Examination), depressive symptoms, and neuroimaging findings (vascular damage and cerebral atrophy) were compared across groups using non-parametric statistics.

Results: Eighty-four patients were included (iRBD $n = 45$; antidepressant-associated RBD $n = 27$; tauopathy-associated RBD $n = 12$). Age at diagnosis did not differ between groups. Male predominance and longer disease duration characterized iRBD. Sleep-related comorbidities, including obstructive sleep apnea and periodic leg movements, were similarly prevalent across groups. Tauopathy-associated RBD showed a markedly higher prevalence of cognitive impairment or dementia, significantly lower MMSE scores, and more frequent and severe cerebral atrophy. Depressive symptoms were most prevalent in antidepressant-associated RBD, whereas vascular neuroimaging findings did not differ among groups.

Conclusion: RBD encompasses etiologically distinct clinical profiles. Stratification by underlying context reveals meaningful differences in cognitive, psychiatric, and neuroimaging features, with important implications for diagnosis, risk assessment, and clinical management.

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1178

NETWORK ANALYSIS REVEALS REM SLEEP LATENCY AND TAU AS KEY BRIDGES LINKING SLEEP ARCHITECTURE, ALZHEIMER'S BIOMARKERS, AND COGNITIVE FUNCTION

Jiong Chen¹, Jiangli Jin², Song Gao¹, Dantao Peng³, Yue Leng⁴

¹Peking University Health Science Center, ²Clinical Trial Research Center, China-Japan Friendship Hospital, ³Department of Neurology, China-Japan Friendship Hospital, ⁴University of California, San Francisco

Introduction: Growing evidence suggests that sleep macro-architecture features show inconsistent associations with cognitive outcomes in aging, including Alzheimer's disease (AD). These inconsistencies underscore the need to clarify which specific components of sleep architecture are most strongly linked to cognition and AD pathogenesis. Our study aims to comprehensively evaluate multiple sleep architecture features and determine how they connect with cognition and AD biomarkers, using network analysis to map potential pathways.

Methods: We included 128 participants (23 cognitively normal, 41 mild cognitive impairment, 64 AD) with overnight polysomnography, from which we extracted sleep architecture measures

including total sleep time, sleep efficiency, sleep onset latency, REM latency, and stage percentages, plasma AD biomarkers (p-tau181, NfL, BDNF), A β PET, and domain-specific cognitive scores. Network analysis was used to quantify conditional interrelationships among sleep architecture, AD biomarkers, and to identify key pathways linking these domains. A partial-correlation-based network was constructed to map associations among sleep architecture, biomarkers, and cognition. Centrality metrics (strength, closeness, betweenness, expected influence) were used to identify key bridge nodes integrating distinct clusters.

Results: Among all sleep parameters, REM latency emerged as the most central feature in the network. REM latency showed partial correlations of -0.23 with BDNF and +0.23 with A β PET, supporting its linkage to AD pathology, and its high closeness centrality indicated that it serves as an efficient integrative node linking sleep, biomarker, and cognitive domains. REM latency also demonstrated one of the highest betweenness values, further underscoring its bridging role in the network. Plasma p-tau181 demonstrated strong negative partial correlations with global cognition (-0.31) and performance on the language domain (-0.27), and its greatest expected influence indicated that tau exerted the strongest net effect across the entire system, shaping not only AD pathology and cognitive performance but also linking back to key sleep features. Consequently, the dominant cross-domain pathway was REM latency $\rightarrow$ p-tau181 $\rightarrow$ cognition, supporting a biomarker-mediated model.

Conclusion: Our results demonstrate that REM latency and plasma p-tau181 form a central bridge between sleep architecture, AD biomarkers, and cognitive impairment. This underscores the critical mechanistic role of REM latency and tau pathology in pathways linking sleep disruption to AD.

Support (if any):

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1179

IMPROVING FIRST-VISIT OPERATIONS THROUGH PRE-VISIT TRIAGE QUESTIONNAIRE ALGORITHM

Michelle Hjelm, Kelly Byars, Lisa Mullen, Matt Wackler, Katie Morrow, Teresa Sutton, Narong Simakajornboon

Cincinnati Children's Hospital Medical Center

Introduction: Our program triages 3,000+ sleep referrals annually, across 11 sub-specialty clinic types. To ensure patients are scheduled into the best clinic for their sleep concerns, patient families complete an intake questionnaire. Historically, this process involved multiple steps: • Questionnaire sent to patient family upon receiving the referral. • Completed questionnaire received and forwarded to provider for review. • Provider returned triage recommendation for specific clinic. • Clinic recommendation sent to scheduling call center. • Call center contacted patient family and scheduled. This workflow was resource-intensive for successful completion. As such, we hypothesized that implementing an automated scoring algorithm would yield more predictable triage decisions, fewer staff touch points, and improved time to scheduling.

Methods: Based on the historical 43-item screening questionnaire, an abbreviated 13-item screening questionnaire with automated algorithmic logic to assign clinics was created. The new questionnaire was validated against historical clinical triage decisions across three, blinded providers. Quality Improvement tools and LEAN methodology to improve the triage process. The team worked to complete a current state and future state value stream map (VSM). Tasks to complete each step in the process were documented on the VSM. Each task and the wait time between tasks were timed and averaged for randomly selected patients. The team then brainstormed possible kaizen opportunities documenting them on the VSM.

Results: The historical process had a lead time of 174 hours and a process time of 12 minutes per referral and a 60% provider agreement on triaged subspecialty clinic. The redesigned process reduced lead time to 94 hours and process time to 10 minutes. Additionally, the provider agreement improved to 95% for the triaged subspecialty clinic.

Conclusion: This approach reduces process delays, minimizes provider bias, and staff touch points through an integrated scoring algorithm. By automating triage, we have achieved more consistent triage decision-making, improved patient and provider experience, and operational efficiencies. The success of this initiative demonstrates the potential for scalable automation in high-volume sleep referrals and fine tuning of triage algorithms to maximize referral efficiency and potentially paving the way for broader application across other specialties.

Support (if any):

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1180

MULTI-PRONGED APPROACH TO SOLVE FRAGMENTED SCHEDULING SYSTEM IN A TERTIARY SLEEP CENTER: ACCESS IMPROVEMENT INITIATIVEVaishal Shah¹, Holta Sulaj², Beata Earl², Parth Modi², Sharan Jhaveri²¹Cleveland Clinic Sleep Disorders Center, ²Cleveland Clinic Health System

Introduction: Administrative inefficiencies significantly delay patient access to healthcare, diagnosis of disease, and contribute to excessive provider time costs and poor patient satisfaction. Outdated, complex and manual fragmented scheduling practices remain a leading source of challenges with access. At the Cleveland Clinic's Sleep Disorder Center, between 40-60% of pediatric sleep consult orders went unscheduled each month in 2020-2021. This study evaluates the impact of targeted initiatives between 2021-2025, aimed at improving access to sleep clinics by scheduling automation via unique informatics tools, increasing clinic capacity, and appointment utilization.

Methods: Several initiatives were introduced using an A3 project charter with continuous improvement methods: (a) electronic Health Record(EHR) based automated ticket scheduling and live dashboard, empowering patients to self-schedule consults, send reminders, and allows schedulers to focus on complex scheduling; (b) Cancellations requests only, where patients receive proactive phone calls for on-the-spot rescheduling and support to prevent loss to follow-up; (c) EHR FAST PASS, which lets patients on a waitlist reschedule earlier; (d) Live EHR Survey for no-shows, identifying addressable causes such as timing and transportation; and (e) Duplicate Appointment Cancellation Bot, which automatically identifies and hides duplicate appointments.

Results: These interventions improved the average proportion of scheduled appointments from 40-60% at baseline in 2020-2021 to 91% in 2022(1273/1401), 88% in 2023(1921/2184), 93% in 2024(1838/1974), and 83% from January-October 2025(1408/1698). Patient preference for the EHR Ticketing system grew steadily, with 49% of scheduled orders in 2022, 52% in 2023, 54% in 2024, and 59% in 2025(Jan-Oct) using this method. These interventions improved access by allowing 215(2022), 863(2023), 780(2024), 350(2025, Jan-Oct) more patients to schedule visits in respective year in comparison to years 2020-2021 leading to better disease detection and time savings for scheduling. Additionally, similar automation measures were generalizable to Home Sleep Apnea Test(HSAT) orders and Behavioral Sleep Consults, with up to 42% of orders processed through the automated system since its introduction in March 2025.

Conclusion: These continuous improvement interventions effectively benefited patients, providers, and administrative staff. The strategies are broadly applicable and can be adopted across healthcare disciplines, significantly improving patient access/disease detection, lowering scheduling time, and improving scheduling flexibility.

Support (if any):

Abstract citation ID: zsag091.1180

1181

INTEGRATING ADVANCED PRACTICE RESPIRATORY THERAPISTS (APRT) INTO SLEEP MEDICINE CLINICAL WORKFLOW

Daniel Thacker, John Konikkara, Mindy Conklin, John Rolf, Daniel Whitt

VA Maryland Health Care System

Introduction: The Advanced Practice Respiratory Therapist (APRT) is a clinician with advanced education and clinical expertise in cardiopulmonary disorders, capable of autonomous assessment, and management within their scope of practice. APRT's scope of practice exceeds that of a registered respiratory therapist (RRT). The pathway to becoming an APRT includes obtaining a

baccalaureate degree in respiratory care, the National Board for Respiratory Care (NBRC) RRT credential, one year of experience as an RRT, and completing a graduate APRT education program. The current Commission on Accreditation for Respiratory Care (CoARC) accredited APRT graduate program requires a minimum of 1,000 clinical hours. This project describes the integration of APRTs into Sleep Medicine practice to enhance access, efficiency and quality of care.

Methods: In this model, the APRT leads an intake clinic for assessment of patients with potential sleep-disordered breathing and orders diagnostic testing. The APRT then reviews results with patients, provides education on the diagnosis and prescribes treatment. APRT follows up with the patient within 90-days of initiation of PAP therapy, when compliance and efficiency is assessed and therapy is modified as clinically appropriate. APRT collaborates with the supervising physician during each of these steps.

Results: Integration of the APRT into the sleep medicine workflow improved clinic efficiency by reducing the wait time and improving treatment compliance. Data between October 2024 and September 2025 revealed a significant increase in the proportion of patients seen within 90 days of initiation of CPAP; a 91% follow up rate was achieved by the end of this period. An increase in PAP compliance from 22% to 36% was observed.

Conclusion: The 90-day follow up by the APRT allowed for early identification of PAP adherence issues, resulting in timely interventions and improved patient compliance. Collaboration between the APRT, Sleep physicians and Respiratory therapists in strengthens continuity of care. The incorporation of an APRT into sleep medicine demonstrates a promising model for improving access to care, patient outcomes and workflow efficiency. As APRTs continue to expand into specialty care, their role in Sleep Medicine may serve as a framework for interdisciplinary practice models that elevate respiratory care across clinical settings.

Support (if any):

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1182

FROM ALERT TO ACTION: IMPROVING OBSTRUCTIVE SLEEP APNEA IDENTIFICATION THROUGH ELECTRONIC HEALTH RECORD CARE GAPS

Rachel Kramer¹, Naia McMillan-Castanares², Thomas Melgar¹

¹Western Michigan University Homer Stryker M.D. School of Medicine, ²University of Michigan

Introduction: Obstructive sleep apnea (OSA) is a prevalent sleep disorder affecting an estimated 39% of men and 26% of women in the United States [1]. Untreated OSA is linked to cardiovascular and metabolic conditions that increase morbidity, mortality, and reduce quality of life, yet, it remains largely underdiagnosed. The United States Preventative Services Task Force (USPSTF) reports insufficient evidence to assess screening for OSA in asymptomatic adults in the general population [2]. However, those with obesity and hypertension represent a population in whom early detection of OSA may meaningfully alter disease trajectory. In 2021, our internal medicine residency clinic implemented an electronic health record (EHR) "care gap" alert to prompt OSA screening in those with a BMI ≥ 35 and hypertension. This study investigates whether the care gap improves screening and downstream diagnosis of OSA.

Methods: We conducted a retrospective chart review of adult patients (≥ 18 years) at our clinic with BMI ≥ 35 and hypertension, without an existing OSA diagnosis. Data were extracted from the Virtual Data Warehouse for encounters three years before and after care gap implementation. Primary outcomes were pre-post differences in ESS and STOP-BANG screening rates, and Sleep Medicine referral rates, including BMI-based subgroup analyses. Secondary outcomes examined downstream diagnostic outcomes including referrals to sleep medicine, appointment attendance, completion of a sleep study, and OSA diagnoses. Descriptive statistics, two-proportion z-tests, and chi-square tests were used for analysis.

Results: ESS screening rates increased from 2.21% pre-intervention (n=16) to 9.15% post-intervention (n=78), a statistically significant difference (95% CI 4.73%–9.16%; Z-test and Chi-square $p < 0.0001$). Referral rates were similar, rising slightly from 13.42% pre-intervention (n=97) to 15.26% post-intervention (n=130), with no significant difference (95% CI -1.62% to 5.31%; Z-test $p = 0.30$; Chi-square $p = 0.2997$). The remaining outcomes are in progress.

Conclusion: Early findings suggest that implementation of this care gap significantly improved OSA screening among high-risk patients, though referral rates did not change. Ongoing analysis will clarify the intervention's impact on diagnostic follow-through. Understanding long-term screening trends and referral patterns may help health systems optimize digital prompts to screen for under-diagnosed conditions and improve outcomes for vulnerable populations.

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1183

CLINICIANS' KNOWLEDGE GAPS IN SLEEP HEALTH SERVICE DELIVERY: EVIDENCE FROM A SYSTEMATIC REVIEW AND A KNOWLEDGE ASSESSMENT SURVEY

Sheethal Kalmadka¹, Yaqoot Fatima², Daniel Sullivan³, M. Mamun Huda⁴, Cele Richardson⁵, Shannon Edmed¹

¹University of Queensland, ²University of Sunshine Coast, ³Griffith University, ⁴Charles Sturt University, ⁵University of Western Australia

Introduction: Sleep disorders are highly prevalent, yet frequently under-recognised and inadequately assessed in primary care and other health care settings. Empirical evidence suggests that primary care and health care providers have low levels of sleep health knowledge and inconsistent screening practices, which may contribute to under-detection of sleep problems. This study conducted a systematic review of sleep disorder-related screening and diagnosis practices of primary care providers (PCPs) and assessed the sleep health knowledge of health care providers.

Methods: A search was conducted in PubMed, Scopus, Web of Science, Embase, and CINAHL, including qualitative and quantitative studies from inception to November 2024. Eligible studies examined sleep health service delivery, sleep knowledge, and perceptions of sleep health in primary care. The review was complemented by a quantitative survey of Australian health care providers using the 30-item ASKME (Assessing Sleep Knowledge in Medical Education) tool.

Results: The review included 37 studies from 19 countries (1996–2024). Studies were organised into four categories, with most focusing on 1) sleep disorder screening practices and sleep-related

knowledge of PCPs ($n=24$) and 2) diagnostic approaches for sleep disorders and gaps in these practices ($n=4$). For screening and knowledge, key findings indicated limited awareness of screening tools, uncertainty regarding clinical guidelines, and inconsistent screening practices. For diagnostic approaches, delays were frequently associated with low confidence in screening, and PCPs reported unclear referral pathways as a barrier. In the primary data, 89 health practitioners (77.5% female; $\text{Mage}=42.5$ years ± 12.94) completed the ASKME survey. Sleep knowledge in this sample was low, with only 34.3% of the sample answering $> 60\%$ of items correctly ($\text{Mscore}=15.4 \pm 5.30$).

Conclusion: This review and data analysis revealed significant sleep knowledge gaps among primary care and other health providers. Lack of training and expertise emerged as key barriers to screening and diagnosis, which may result in missed opportunities and delayed detection of sleep disorders. Improving integration of sleep care into non-specialist health care settings requires enhanced education, standardised screening pathways, and decision-support tools within clinical workflows.

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1184

POSITIVE-AIRWAY PRESSURE ADHERENCE IS ASSOCIATED WITH DECREASED HEALTHCARE EXPENDITURE: A PILOT STUDY IN LAW ENFORCEMENT OFFICERS

Anya Jayanthi, Cristian Zhang, Christina Katehis, Sarah Cohen, Beth Staley, Colleen Walsh, Philip Gehrman, Indira Gurubhagavatula
University of Pennsylvania

Introduction: Law enforcement officers (LEOs) are at risk for obstructive sleep apnea (OSA) due to high prevalence of risk factors including obesity, middle age and male gender. OSA leads to high healthcare costs for employed adults. For LEOs, OSA-related daytime sleepiness may also impact job performance in an occupation for which the consequences can be significant. The impact of diagnosis and treatment of OSA with positive airway therapy (PAP) in this population, and an assessment of whether this approach can lower healthcare costs is unknown.

Methods: This pilot study evaluated a telemedicine-driven program to screen and treat OSA in LEOs. High-risk participants identified by Multivariable Apnea Prediction Index (MVAP) ≥ 0.6 underwent home sleep testing, and those diagnosed with OSA started PAP with remote monitoring. Epworth sleepiness scale (ESS), quality-of-life (FOSQ) scores, and healthcare expenditures were collected at baseline and tracked after PAP initiation. We conducted descriptive statistics (proportions) for ESS, FOSQ, and used Kruskal-Wallis to assess significance of cost data.

Results: Out of 192 screened LEOs, 37 were eligible, and 30 enrolled in the study. A total of 29 participants underwent home sleep apnea testing, 23 of them were diagnosed with OSA and prescribed PAP. 22 participants started PAP therapy, and 13 of them maintained PAP compliance over the 24-month period. Mean ESS decreased from 7.8 to 5.0 in 6 months, and FOSQ increased from 3.4 to 3.7 over 18 months ($p>0.05$). PAP adherence varied, 10% were compliant, 33% moderately compliant, 13% did not use it, and the rest did not report data. Reductions in ESS correlated with the degree of PAP adherence, with greater use associated with a larger reduction in sleepiness. In contrast, increased health

expenditures were observed among non-users and partial users ($p=0.0433$).

Conclusion: This pilot study demonstrates that consistent PAP use among LEOs with OSA tended to have reduced medical and medication costs within two years of treatment initiation, whereas partial or non-use led to increased healthcare costs. Full PAP adherence may drive meaningful economic benefit, and larger studies should explore additional OSA treatments as well.

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1185

REAL-WORLD FEASIBILITY OF ANCHOR SLEEP IN NIGHT SHIFT WORKERS

Courtney Barr¹, Marleigh Treger², Christopher Drake³, Philip Cheng³

¹Henry Ford Sleep Research Center, ²Henry Ford Sleep Research, ³Henry Ford Health System

Introduction: Irregular and insufficient sleep is a widespread challenge for individuals working nightshift and rotating schedules and can exacerbate circadian misalignment. Anchor sleep is a strategy that establishes a consistent 3–4-hour window of overlapping sleep across workdays and non-workdays and has emerged as a promising strategy to improve sleep quality. This study examines whether anchor sleep is more readily implemented among individuals with fewer familial or social obligations. We hypothesized that those with fewer home-related demands will show stronger adherence to an anchor sleep intervention.

Methods: Data collection included participant-reported sleep diaries and demographic profiles from a hybrid type I effectiveness-implementation trial in a sample of night shift workers with Shift Work Disorder ($N = 87$). The trial tested a mobile application that presented behavioral recommendations to reduce circadian misalignment via anchor sleep. Only those in the active condition were included in this analysis. Successful implementation of anchor sleep was defined as starting out of phase and reporting a “lights out” time between averaging between 2:00a and 6:00a in post intervention sleep diaries. Demographic information included household and personal characteristics such as household size, number of dependents, and relationship status.

Results: 33.33% of participants who were not initially implementing anchor sleep were able to achieve it during at least one time-point, and 26.44% of participants maintained it throughout the entire study. 40.23% were never able to implement anchor sleep or started but could not maintain it. Contrary to our hypothesis, results did not indicate a difference in achieving anchor sleep between those with and without dependents ($\chi^2 = 0.19$, $df=1$, $p=0.66$), or having a domestic partner ($\chi^2 = 0.61$, $df=1$, $p=0.44$). No differences were found by household size ($\chi^2 = 6.25$, $df=4$, $p=0.18$).

Conclusion: These findings suggest that the feasibility of achieving anchor sleep is not driven by partner status, dependents, or household size. There are likely other barriers preventing adherence to a consistent 3–4-hour sleep window. Future directions may account for additional social factors such as partner work schedules, quantitative measure of familial obligation, and support level from partners.

Support (if any): NIH R42HL163783 awarded to Dr. Philip Cheng.

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1186

WAKING UP TO PATIENT NEEDS: RESTRUCTURING SUPPORT MODELS FOR NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA

Sujith Modugula¹, Liz Lezama², Kathy Chan², Jenny Rose³,
Tammy Anderson³, Anna Wani⁴

¹University of Texas Southwestern Medical Center, ²The University of Texas Southwestern, ³Wake Up Narcolepsy, ⁴Children's Health

Introduction: Wake Up Narcolepsy (WUN) provides educational programming and support for individuals with Narcolepsy and Idiopathic Hypersomnia (IH). While clinical management focuses on pharmacotherapy, patient quality of life relies heavily on community support and symptom management strategies. This quality improvement initiative evaluated the efficacy of WUN event formats to identify structural barriers to patient engagement and optimize future support interventions.

Methods: A mixed-methods approach was utilized to assess a patient education and support event. Quantitative data was collected via pre- and post-event surveys (n=17 pre, n=13 post) utilizing Likert scales to assess baseline disease understanding and event satisfaction. Subsequently, thematic analysis was performed on data from two focus group sessions (n=6) comprising patients, caregivers, and governing body representatives. Primary outcomes included event logistical suitability, support group dynamics, and facilitation efficacy.

Results: While survey data indicated a high baseline need for community connection, post-event feedback revealed that standard conference logistics are limited by patient pathophysiology. Analysis highlighted significant logistical barriers, specifically that standard event durations without dedicated "nap rooms" caused symptom exacerbation. Regarding group dynamics, participants reported that breakout sessions exceeding 20 attendees limited patient sharing and the presence of non-patient observers impacted vulnerability. Finally, in terms of facilitation, there was a marked preference for "lived experience" leadership; peer-to-peer bridging sessions were rated highly, whereas clinically led sessions were perceived as lacking practical management insights.

Conclusion: Standard educational models for hypersomnolence do not account for the physiologic limits of the patient population. To succeed, support events require structural changes: strict caps on breakout groups, specific cohort segregation to address the distinct needs of narcolepsy and IH. Future initiatives must prioritize peer-led facilitation to encourage patient engagement and vulnerability.

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1187

A REAL-WORLD ANALYSIS OF PATIENT-APPLIED, HOME POLYSOMNOGRAPHY USE ACROSS US AND EUROPEAN SETTINGS

Tanya Dimitrov¹, Mariele Stockhoff¹, Steven Coughlin¹,
Hartmut Schnieder², Nils Velten¹

¹Onera Health, ²American Sleep Clinic

Introduction: While home polysomnography shows promise for expanding access to comprehensive sleep diagnostics, real-world data on technical performance and usage patterns is limited.

This study analyzed outcomes from patient-applied home PSG (hPSG) studies conducted across US and European (EU) healthcare settings using the Onera Sleep Test System (patch-based PSG).

Methods: A total of 4,683 (3,817 EU, 866 US) sleep studies were performed across 30 sleep clinics (15 EU, 15 US) between January 2025 -December 2025 using a patient-applied, patch-based hPSG system. The patch-based device was shipped to the patient's home with a return label and was sent for scoring as part of a "PSG as a Service" pipeline. Studies were conducted exclusively at patients' homes, self-applied without technician intervention, and were manually scored according to AASM criteria. Data collection included technical performance metrics such as scorer-reported signal quality assessments and study completion times.

Results: The clinician reported sleep study acceptance rate was 86.0% (85.8% EU, 86.6% US). A patient success rate of 94% (94.2% EU, 93.3% US) was reported. Average time from study request to report completion was 11.0 ± 5.76 days (11.3 ± 6.6 days EU, 11.2 ± 3.7 days US) with an average device shipping turnaround time of 10.0 ± 5.6 days (10.5 ± 6.3 days EU, 8.6 ± 3.4 days US) and scoring completed within 0.75 ± 1.6 days (0.4 ± 1.4 days EU, 2.1 ± 1.9 days US) providing insight into clinical workflows with the patch-based device and scoring. Among the studies assessed by sleep scorers, >80% quality was achieved for almost all essential signals—body position (98.5% of studies), nasal pressure (94.6%), respiratory effort or flow (94.0%), EMG (90.7%), EEG (88.4%), EOG (89.0%) and SpO2 (76.6%).

Conclusion: This first real-world analysis demonstrates that patient-applied hPSG achieves consistent technical success rates across different regions with high signal quality. The results of this research provides evidence in support of home diagnostics and could address the significant challenge of limited access to in-lab PSG facing sleep medicine practices today.

Support (if any):

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1188

LISTENING TO THE COMMUNITY TO LEAD SCIENCE: AN ENGAGEMENT APPROACH TO IDENTIFYING SLEEP RESEARCH PRIORITIES

Alexa Watach, Amy Sawyer, Peter Cronholm, Melany Batad,
Heather Klusaritz

University of Pennsylvania

Introduction: Partnered Research in Sleep Medicine (PRISM) is a PCORI-funded engagement initiative that addresses sleep health through community conversations, awareness events, and development of shared resources to build capacity for partnered sleep research. PRISM includes convening of an Advisory Board (AB), comprised of 16 local and national partners, to discuss patient-centered solutions for common sleep disorders like OSA and insomnia. We summarize the AB's process for identifying high-priority sleep topics/areas to address.

Methods: We applied modified Nominal Group Technique (NGT) to achieve group consensus on priority topics. During a 90-minute virtual AB meeting, the question was discussed in small breakout rooms (1. OSA/insomnia patients; 2. industry/provider partners). A comprehensive list of priorities was captured from those discussions. The PRISM engagement team reviewed items and grouped similar responses into 7 categories: awareness (general), awareness (comorbidities), awareness (populations affected), access, causes of sleep disruption, treatment, and outcomes. Grouped

items were vetted at the next AB meeting. The AB was surveyed with the finalized items and asked to vote for their top 3 categories/priorities. In the second voting round, the AB revoted having reviewed the previous voting round results to represent group consensus.

Results: Round one of voting (n=14) ranked areas as follows: (1) Awareness (comorbidity), (2) Treatment, (3) Outcomes, (4) Access, (5) Awareness (general), (6) Awareness (populations affected), (7) Causes of Disrupted Sleep. Round two (n=11) resulted as: (1) Awareness (comorbidity), (2) Treatment, (3) Outcomes, (4) Awareness (general), (5) Access, (6) Causes of Disrupted Sleep, (7) Awareness (populations affected).

Conclusion: Consensus for the top 3 priority areas for sleep researchers to address include: (1) increasing awareness about comorbidities [defined by the need to raise awareness about how poor sleep is connected to other health conditions including heart disease, mood disorders, and having both insomnia and sleep apnea]; (2) treatment [defined as the need to ensure treatment meets the needs of the individual for comprehensive care and to develop and identify appropriate tests and treatments]; and (3) outcomes [defined as the need to prioritize outcomes that are valued by patients and meet provider care goals].

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1189

MACHINE LEARNING-BASED CLINICAL DECISION SUPPORT SYSTEM (CDSS) FOR EFFICIENT SLEEP CLINIC MANAGEMENT: TARGETING OSA AND RBD

Hyeon Jin Kim¹, Heungjin Park², Youngseo Kim³, Younghan Lee⁴, Hyang Woon Lee⁵

¹Department of Neurology, Neurocritical Care Team, Asan Medical Center, ²Department of Neurology, Asan Medical Center, ³Department of Artificial Intelligence Convergence, Ewha

Womans University, ⁴Department of Convergence Security Engineering, Sungshin Women's University, ⁵Departments of Neurology and Medical Science, Computational Medicine, System Health Science and Engineering and Artificial Intelligence Graduate Programs, Ewha Womans University School of Medicine and Ewha Medical Research Institute

Introduction: The diagnosis of growing public health challenges, Obstructive Sleep Apnea (OSA) and REM Sleep Behavior Disorder (RBD), is hindered by Polysomnography's (PSG) inefficiencies: low-specificity screening and a laborious, subjective manual scoring process complicated by differentiating isolated RBD (iRBD) from OSA-induced "pseudo-RBD." This project proposes a two-stage, integrated Machine Learning (ML)-leveraged CDSS to overcome this diagnostic bottleneck and improve clinical management.

Methods: Retrospective data was collected from 1,256 patient records at Ewha University Medical Center Mokdong Hospital (April 2016 - March 2022) under IRB approval. Excluding patients with CPAP titration, split-night studies, age < 40, or unclear diagnoses, the final cohort was 749 patients (62 RBD, 324 moderate-to-severe OSA, 15 coexisting, 348 other sleep disorders). The comprehensive dataset included demographics, lifestyle, 198 standardized questionnaire responses, and 49 manual PSG scoring variables. From 225 initial demographic and questionnaire items, 88 features were selected for machine learning classifier development.

Results: To address data deficiencies and optimize model efficacy, the dataset was partitioned into training (70%) and test (30%) subsets. Missing values within the training set were imputed utilizing the HyperImputer approach. This was succeeded by synthetic data augmentation employing TabSyn, which generated an additional 2,000 samples with a Cumulative Distribution Difference Error (CDDE) and Pairwise Correlation Consistency (PCC) exceeding 90%. A binary classification model was subsequently developed using the XGBoost gradient boosting algorithm. Model performance was validated through 5-fold cross-validation, achieving a sensitivity of 89% and a precision of 76%. Feature importance in the best-performing model was assessed using SHAP, permutation importance, XGBoost gain importance, and mutual information. Models constructed using the top 10, 20, and 30 features maintained performance comparable to the full-feature model (88 features), demonstrating a sensitivity of approximately 86% and a precision of 76%.

Conclusion: This CDSS is engineered to furnish objective metrics and standardize analysis, thereby mitigating inter-scorer variability and enhancing diagnostic precision across three critical phenotypes: pure iRBD, comorbid iRBD and OSA, and OSA presenting with parasomnia-like features. The anticipated outcome includes substantial clinical and economic benefits, notably a significant reduction in diagnostic expenditures.

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1190

A TEAM-BASED QUALITY IMPROVEMENT INITIATIVE TO ADDRESS DIAGNOSIS AND MANAGEMENT GAPS IN NARCOLEPSY CARE

Michael Thorpy¹, Bruce Corser², Jeff Carter³, Clare Alexander³, Chelsie Anderson³, Cherilyn Heggen³, Kali Olson³, Larissa Jarzylo³

¹Albert Einstein College of Medicine, ²Intrepid Research, ³PRIME Education

Introduction: Narcolepsy can significantly affect long-term outcomes and quality of life; however, the complexity of this disorder hinders timely diagnosis and treatment. This quality improvement initiative sought to uncover practice patterns and challenges to inform team-based action plans for care improvement.

Methods: Between October 2024 and February 2025 clinicians from three US sleep centers were surveyed and an audit of patient charts was completed. Patient surveys were collected through collaboration with the Hypersomnia Foundation to identify barriers to care. Results from the surveys and chart audits were then shared with the sleep centers at three expert-led audit-feedback sessions. Pre- and post- surveys measured the impact of the sessions on knowledge, confidence, and performance, and teams developed action plans to address identified gaps in narcolepsy care. Follow-up surveys assessed the sustainability of plan implementation.

Results: Clinicians' (N=57) leading challenge to diagnosis was distinguishing narcolepsy from other conditions (61%), and 23% did not feel confident in assessing sleep disorders (1, 2, or 3 on a 5-point Likert scale). While most clinicians used the Epworth Sleepiness Scale (95% surveys, 88% charts [N=120]) for assessments, the narcolepsy symptom pentad was documented less frequently (37% surveys, 33% charts). The top barrier to treatment selection was balancing concurrent conditions and safety of treatments (61%). Medication adjustments/changes occurred

in 64% of charts, with 19% due to treatment side effects or new/worsening comorbidities. Only 64% of clinicians felt their patients were on track to achieve their treatment goals. Following the audit-feedback sessions, clinicians (N=33) reported increased confidence in assessing symptoms, knowledge of treatment options, and selecting treatments based on patient-specific factors. Action plans targeted improving the documentation of symptoms, addressing comorbidities, reviewing treatment options, and individualizing care plans. Follow-up surveys (N=12) illustrated sustained practice change, with teams reporting increased symptom documentation, comorbidity evaluations, and personalized treatment selection.

Conclusion: This initiative identified key gaps in diagnosis and management of narcolepsy and its associated comorbidities, and demonstrates the utility of structured, team-based interventions as a basis for addressing these unmet needs.

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1191

BREATHE EASIER: EARLY FOLLOW-UP CUTS READMISSIONS IN CHRONIC HYPERCAPNIC PATIENTS STARTED ON NIV: A QUALITY IMPROVEMENT INITIATIVE

Deandra Kuruppu¹, Christopher Lau², Armeen Mehrbani¹, Matthew Boliaux¹, Megan Miranda¹, Jayen Sum¹, Joyce Lee-Iannotti³, Matthew Chaung¹

¹University of Arizona, Phoenix, ²University of California Los Angeles, ³Barrow Neurological Institute

Introduction: Chronic hypercapnic respiratory failure (CHRF), commonly due to chronic obstructive pulmonary disease (COPD), obesity hypoventilation syndrome (OHS), or neuromuscular disease, carries high readmission (23% at 30 days) and mortality (30–49% at 1 year) despite noninvasive ventilation (NIV). While NIV therapy can be effective in reducing complications, the role of timely outpatient follow-up in preventing readmissions remains insufficiently understood.

Methods: We conducted a retrospective cohort study of adult patients discharged on new NIV for CHRF from a tertiary hospital (Dec 2023–Oct 2024), assessing demographics, prior hospitalizations, timely follow-up, and readmission rates 6 months post discharge. Subsequently, a quality improvement initiative (Nov 2024–Apr 2025) assigned a telehealth pulmonary follow-up within 4 weeks, using four standardized adherence questions. Electronic health data were analyzed; primary outcome was 30-day readmission rates. Descriptive and comparative statistics were performed.

Results: Of 71 patients discharged on new NIV for CHRF, 45 comprised the pre-intervention cohort and 26 the post-intervention cohort. Pre-intervention, only 26.7% had follow-up within 30 days (readmission rate 8.3%); 73.3% had no follow-up (readmission rate 45.5%). Post-intervention, 65.4% completed timely telehealth follow-up (readmission rate 11.8%); 34.6% did not (readmission rate 44.4%). Overall, patients with timely follow-up had a 10.3% 30-day readmission rate versus 45.2% without follow-up ($p < 0.001$). Of 71 patients, 32 (45%) had ≥ 1 hospitalization in the year preceding NIV initiation, with an average of 2.37 hospitalizations per readmitted patient.

Conclusion: In patients with chronic hypercapnic respiratory failure newly initiated on NIV, timely outpatient follow-up within

4 weeks was associated with markedly lower 30-day readmission rates (10.3% vs 45.2%). Despite high risk, many patients discharged on PAP therapy for hypoventilation syndromes do not receive timely follow-up—a critical care gap strongly linked to early readmissions. This QI initiative with structured discharge planning and early specialty follow-up significantly improved outcomes. Healthcare systems should prioritize comprehensive transitional care, expanded telehealth, and transitional care models to ensure consistent, timely access to specialty care, reduce preventable readmissions, and improve survival in this vulnerable population.

Support (if any):

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1192

HEALTH DISPARITIES ASSOCIATED WITH OSA AMONG PATIENTS UNDERGOING BARIATRIC SURGERY

Tamara Jordan¹, Virginia Skiba¹, Seif Bugazia², Arthur Carlin²

¹Henry Ford Hospital, ²Henry Ford Health, Macomb

Introduction: Obstructive sleep apnea (OSA) is predicted to affect over 54 million adults in the U.S. and is highly associated with obesity. Bariatric surgery is a widely accepted treatment for obesity, and current guidelines recommend OSA screening as part of the preoperative evaluation. Although research has highlighted the disparities that exist with postoperative outcomes and with OSA diagnosis and treatment, this study aims to further evaluate some of the disparities faced by OSA patients undergoing bariatric surgery to help identify ways to mitigate some of these adverse outcomes that disproportionately affect certain patients.

Methods: This was a retrospective study conducted in a large urban tertiary medical center that included OSA patients who underwent bariatric surgery from April 2023 to March 2024. Median and interquartile ranges (Q1, Q3) for preoperative 3% apnea-hypopnea index (AHI), preoperative 3% oxygen desaturation index (ODI), and time from OSA diagnosis to surgery were presented for levels of different socioeconomic status (SES) variables. Statistical significance of difference was tested using Kruskal-Wallis rank sum testing.

Results: 252 patients were included in the final analysis. AHI was significantly associated with gender ($p=0.016$), age at time of surgery ($p=0.016$), and race ($p=0.003$). ODI was significantly associated with gender ($p=0.012$) and race ($p=0.037$). Time from OSA diagnosis to surgery was significantly associated with age ($p=0.012$). There was no significant association between ODI, AHI, or time to diagnosis for ethnicity, marital status, education, employment, income, or type of insurance.

Conclusion: Age, race, and gender were found to significantly contribute to differences in ODI, AHI, and length of time between OSA diagnosis and bariatric surgery. Our results show that earlier referral for OSA testing for certain groups may help mitigate some of the adverse effects associated with delay in OSA diagnosis. This adds to the current body of research identifying some of the SES factors that affect outcomes for patients with OSA, particularly for those undergoing bariatric surgery. Further research is needed to help guide current practices in Sleep Medicine and Bariatric Surgery that will help reduce the inequities associated with OSA, thereby reducing the disparities associated with morbidity and mortality among these patients.

Support (if any):

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1193

IMPLEMENTING PATIENT-CENTERED PRACTICES TO ADVANCE IDIOPATHIC HYPERSOMNIA CARE: KEY FINDINGS FROM A QUALITY IMPROVEMENT INITIATIVEEmily Zyborowicz¹, Thomas Scammell², Rachel Salas³, Jeff Carter¹, Jacqueline Maytorena¹, Laura Simone¹, Cherilyn Heggen¹, Alexandra Garcia-Moreno¹, Larissa Jarzylo¹¹PRIME Education, ²Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children's Hospital, Boston, MA, USA, ³Johns Hopkins Medicine

Introduction: The management of idiopathic hypersomnia (IH) represents a significant challenge in clinical practice owing to the heterogeneity of symptoms, impact of comorbidities, and individual patient needs, goals, and preferences – all informing treatment selection and ongoing management. This initiative aimed to characterize the challenges that impede optimal IH management and identify patient-centered practices that facilitate quality care.

Methods: Between May 2024 and July 2025, three US-based sleep clinics participated in a quality improvement initiative. Clinics participated in audit-feedback sessions to evaluate real-world data, identify gaps in evidence-based assessment and management of IH, and develop action plans. Follow-up sessions were held to assess progress and refine action plans. Data was collected through baseline and follow-up clinician surveys and patient chart audits. Patient survey data was collected in collaboration with Hypersomnia Foundation.

Results: Clinicians' (N=139) top challenge in managing IH included staying current with emerging evidence (41%), difficulties in therapy selection and dosing (33%), and identifying and managing comorbidities (31%). Most clinicians felt familiar with treatment options (55%; Likert 3/4/5) and felt confident in providing timely, evidence-based, and coordinated care (54%; Likert 3/4/5). While about half of patients (N=90) had cardiovascular comorbidities, only 59% of clinicians regularly assessed them and 41% said that managing comorbidities was a barrier to treating IH. Survey findings also revealed gaps in perceptions of shared decision-making with clinicians reporting that goals and preferences were discussed (59%) while only 35% of patients reported the same. Clinicians set goals to individualize care through evaluating the impact of comorbidities, tailoring treatment to patient-specific needs, and engaging patients in their care. Increases in counseling related to medications, comorbidities, and medication adherence were observed in a patient chart audit (N=90) as well as improvements in incorporating patient factors and patient engagement on surveys (N=25) upon follow-up.

Conclusion: This initiative demonstrated actionable strategies to personalize IH management through the incorporation of patient-specific factors, needs, and goals into treatment and the impact of quality improvement measures on the delivery of patient-centered care.

Support (if any): This program was supported by an independent medical educational grant from Jazz Pharmaceuticals.

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1194

IMPROVING CPAP ADHERENCE THROUGH MASK FIT OPTIMIZATION: A QUALITY IMPROVEMENT INITIATIVE IN THE OUTPATIENT SLEEP CLINICEmma Oldham¹, Lori Koltenuk¹, Allison Lear¹, Sanjay Patel², Venkatesh Krishnamurthy³¹UPMC, ²Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, Department of Medicine, University of Pittsburgh,³University of Pittsburgh

Introduction: Continuous Positive Airway Pressure (CPAP) is the standard treatment for obstructive sleep apnea (OSA), yet adherence remains suboptimal and mask problems may limit patient use. We created a mask-fit clinic to address this issue, but its value is unclear. We initiated a quality improvement project to evaluate the impact of this clinic on improving CPAP adherence.

Methods: We initiated a mask-fit clinic at two sleep clinics. Adult patients with OSA who report mask discomfort or adherence difficulties specifically due to mask issues are referred by their sleep provider for an individualized mask-fit evaluation which consists of a structured 60-minute, in-person session conducted by a sleep technologist and nurse practitioner. Multiple mask styles are presented and trialed based on patient complaints. Once a preferred mask is selected, the patient is evaluated wearing the mask with CPAP at pressure to facilitate acclimation and allow further troubleshooting. The value of this session was assessed by comparing CPAP adherence in the two weeks prior and two weeks following the mask-fit session based on data downloads.

Results: To date, 27 participants (mean age 62 ± 15 yrs, 56% female, 74% White) attended the mask-fit clinic. Mean apnea hypopnea index (AHI) was 32 ± 20 events/hr. Patients had been using CPAP for a median of 16 months (IQR [3, 56]). The mask was changed to a new style in 20 patients (74%), changed to a new size in 4 patients (15%), and not changed in 3 patients (11%). Mean adherence increased by 17 minutes from 287 ± 29 min to 304 ± 27 min, though this difference was not statistically significant (p=0.45). No change in mean leak was observed (28 ± 7 L/min to 29 ± 5 L/min. p=0.88).

Conclusion: Preliminary findings suggest that a structured, in-person mask fitting session may increase CPAP adherence by optimizing mask comfort. Ongoing data collection and a larger sample size will allow for a more precise assessment of the benefits of this intervention.

Support (if any):

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1195

INTEGRATING EDUCATIONAL OUTCOMES AND REAL-WORLD CLAIMS DATA TO IMPROVE IDIOPATHIC HYPERSOMNIA DIAGNOSIS AND MANAGEMENTRussie Allen, Tom Bregartner
Med Learning Group

Introduction: Idiopathic hypersomnia (IH) is a common yet under-recognized disorder that can be associated with significant functional impairment and delay in treatment due to barriers differentiating IH from other central disorders of hypersomnolence. Needs assessments identified gaps in clinician understanding of diagnostic criteria and key distinguishing features of the disorder (eg, sleep inertia, unrefreshing sleep) and inclusion of cardiometabolic risk in treatment decision-making. Delivering scalable, outcomes-based education that is validated with real-world data may begin to address these gaps.

Methods: Med Learning Group provided a multimodal IH educational program for multidisciplinary clinicians that consisted of live/virtual symposia and TeleECHO clinics, an interactive gamified online module, and point-of-care decision-support tools. Evaluation of educational impact included pre/post knowledge questions, competence and confidence ratings, follow-on surveys, and self-reported change in practice behavior. To independently evaluate the effect of education on clinician behavior beyond self-report, Med Learning Group commissioned a real-world evidence (RWE) claims analysis, currently underway, through its partnership with IQVIA. More than 7,200 educated clinicians were matched 1: 1 with non-exposed controls by specialty, geography, baseline IH/narcolepsy diagnostic volume, and prescribing volume. New IH and narcolepsy diagnoses will be analyzed for 12 months before education, and all available months after education. An ANCOVA-based promotion-evaluation model will determine whether educational exposure is associated with a change in diagnosing behavior.

Results: In the 4 IH-focused education interventions (N>12,000), correct answers on knowledge and competence-based pre/posttests improved 37%–60%. Learners expressed intention to change practice in 80%–87% of cases; planned changes include improving diagnostic work-flow, identifying critical IH features, assessing unrefreshing sleep and sleep inertia, and factoring cardiovascular risk into treatment decisions. Follow-on surveys indicated that guideline-concordant practice changes were being implemented by up to 79%. RWE analysis is in progress. Complete results, including anticipated increases in new diagnoses of IH and narcolepsy among educated and control clinicians, will be available at SLEEP 2026.

Conclusion: A large-scale, multimodal educational approach demonstrated meaningful improvement in clinician knowledge and self-reported practice behaviors related to IH. Future claims-based analyses will determine whether these improvements impact diagnosis in the real world.

Support (if any): Supported by an independent medical education grant from Jazz Pharmaceuticals.

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1196

QUALITY OF AMYOTROPHIC LATERAL SCLEROSIS CARE AT A SINGLE VETERANS AFFAIRS MEDICAL PROGRAM

Catherine Tarantine¹, Charles Atwood², Blair Stone¹

¹University of Pittsburgh Medical Center, ²Veterans Affairs Pittsburgh

Introduction: Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease marked by progressive motor neuron loss, respiratory failure, and ultimately death. Early signs of respiratory muscle weakness include sleep-disordered breathing, especially

nocturnal hypoventilation. Sleep medicine providers can intervene to provide treatment, which can not only improve quality of life but also survival. ALS disproportionately affects Veterans and is designated as a presumptive service-connected condition. However, gaps remain in our understanding of the quality of ALS care delivered within the Veterans Health Administration. This study evaluated the quality of ALS care provided at the VA Pittsburgh Healthcare System (VA) ALS program.

Methods: This study examined the quality of ALS care provided to Veterans at a single VA ALS program. The American Academy of Neurology ALS Quality Measures were adapted to include additional measures of pulmonary/sleep management. Demographics, travel burden, and rurality data were collected. All Veterans with ALS who attended at least one appointment at the Multidisciplinary ALS Clinic between January 2021 and September 2025 were included. Data were collected through manual chart review. Relevant clinical notes were reviewed to identify any possible barriers or factors influencing adherence to quality measures. Summary statistics were calculated.

Results: Thirty-one Veterans received care at the Multidisciplinary ALS Clinic. All Veterans were male. 87.1% were White. 9.7% lived in a rural Rural-Urban Commuting Area code. 32.3% of the Veterans had at least one visit through telemedicine. 90.3% of the Veterans received a disease modifying treatment. All Veterans were seen by neurology, speech-language pathology, pulmonary/sleep medicine, and palliative care. 26.7% of the Veterans had a percutaneous endoscopic gastrostomy tube. 77.4% of the Veterans were prescribed a suction machine. 64.5% of the Veterans were prescribed a non-invasive ventilator. 80.6% of the Veterans were prescribed a mechanical insufflation-exsufflation device (i.e. "Cough Assist"). No Veterans used invasive ventilation.

Conclusion: Overall, Veterans received care aligned with the American Academy of Neurology Quality Measures. Most Veterans received all recommended respiratory support devices. Expanded use of telemedicine may further reduce travel burden for Veterans.

Support (if any): Catherine Tarantine is supported by the ATS ASPIRE Fellowship.

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1197

QUIET AT NIGHT: A NURSE-LED QUALITY IMPROVEMENT PROJECT TO REDUCE NIGHTTIME ENVIRONMENTAL DISRUPTIONS IN A VA SUBACUTE REHABILITATION SETTING

Geraldine Manahan, Maria Marques, Krystin Dustin, Gilda Cain, Paul Lehan, Annemarie Ward, Marie Montinard, Jose Cardoso, Bonnie Rowe, Theresa Presley, Matthew Goulet, Laura McDonald, Emily Jones, Jane Driver, Julia Boyle
VA Boston Healthcare System

Introduction: Environmental factors (e.g., noise) can impact sleep quality in subacute rehabilitation settings, which can further impact treatment progression and functional recovery. This nurse-led quality improvement project sought to implement the VA Quiet at Night initiative by providing patient resources to reduce noise, establishing quiet hours, and discussing sleep goals with veterans.

Methods: Project Champions were identified from Nursing Staff prior to the start of implementation on VA Boston's subacute rehabilitation unit. This unit provides short-term skilled nursing

or rehabilitation care (i.e., ≤ 90 days) following acute injuries or illnesses. Veterans were offered “Quiet at Night” items, including headphones, sleep masks, ear plugs, “Quiet Please” door hangers or white noise machines. Veterans answered 5-item feedback surveys about quiet items, quiet hours, sleep goals discussions with their care team, sources of noise, and suggestions for reducing noise. Feedback surveys were collected by Nurse Champions on the first day of every month for 6 months. Descriptive and frequency analyses were used to describe preliminary results overall and at the baseline and 6-month timepoints.

Results: Feedback surveys (N=96) were collected over a 6-month period with an average of 16 surveys per month (Mean=16 $\pm$ 3.9; Range=13-23). Overall, 60.4% of veterans received the “Quiet at Night” items with improvements from baseline (46.2%) to 6-months (93.3%); 74.0% reported awareness of daily quiet hours with improvements from baseline (61.5%) to 6-months (93.3%); and 45.8% reported discussing sleep goals with their care team with improvements from baseline (38.5%) to 6-months (66.7%). Veterans identified equipment (27.1%) (e.g., medical equipment, TV’s, A/C’s) as the primary source of noise with the most common suggestion to close doors or courtesy curtains (9.4%). Notably, one-third of all veterans reported no noise concerns (35.4%) and almost half did not have suggestions for change (49.0%) during implementation.

Conclusion: Preliminary results demonstrated improvements in access to noise-reducing resources, patient awareness of quiet hours, and discussions of sleep goals with providers within the first 6-months of this quality improvement project. Nurse-led innovations may be effective in reducing environmental noise in subacute rehabilitation settings, which may have important implications for prioritizing sleep in this care setting.

Support (if any):

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1198

UNCOVERING UNMET NEEDS IN NARCOLEPSY CARE TO INFORM TEAM-BASED PRACTICE IMPROVEMENTS

Michael Thorpy¹, Bruce Corser², Jeff Carter³, Clare Alexander³, Chelsie Anderson³, Cherilyn Heggen³, Kali Olson³, Larissa Jarzyl³

¹Albert Einstein College of Medicine, ²Intrepid Research, ³PRIME Education

Introduction: Narcolepsy greatly impacts individuals’ quality of life; however, patients experience significant barriers to diagnosis, referral, and treatment planning. This quality improvement (QI) initiative aimed to identify gaps in narcolepsy care and inform actionable strategies to improve clinical workflows.

Methods: Patient surveys were collected through collaboration with the Hypersomnia Foundation in August 2024 to identify real-world barriers to care. Clinician surveys and patient chart audits were completed at three US-based sleep centers to assess baseline practice patterns. Findings were then shared with the participating centers at three live audit-feedback sessions to support development of action plans based on identified gaps, and pre-/post- surveys measured impact of the session on approaches to narcolepsy care. Follow-up sessions and surveys assessed sustainability of action plan implementation.

Results: Among the 94 patients surveyed, 69% reported narcolepsy greatly impacting their quality of life (4 or 5 on a 5-point Likert scale), with excessive daytime sleepiness rated as the most bothersome symptom (52%). Narcolepsy strongly impacted career

(71%) and family (54%) decisions. Eighty-five percent waited > 1 year for diagnosis; the top barriers were delays in appointments/referrals (32%) and narcolepsy symptom distinction (31%). Patients’ top challenge to managing narcolepsy was caring for their comorbidities (53%) and they prioritized selecting treatment with low risk of side effects (58%). Only 34% felt fully on track with their treatment goals and expressed desire to discuss treatment options (55%). Following clinic-based sessions, clinicians’ (N=33) confidence in assessing narcolepsy symptoms and individualizing treatment plans based on comorbidities increased. Action plans targeted streamlining diagnosis, coordinating referrals, and patient-centered treatment planning. To achieve these goals, clinicians committed to improving communications between healthcare teams (61%), engaging patients in shared decision-making (61%), and reviewing treatment options with patients (36%). At follow-up (N=37), teams reported improved symptom assessment workflows, referral collaboration, and patient-centered engagement in treatment planning.

Conclusion: Patient surveys from this QI initiative uncovered key barriers patients experience in narcolepsy care, and informed team-based development of sustainable action plans focused on streamlining patient-centered approaches to symptom assessment, diagnosis, and treatment decision-making.

Support (if any): This program was supported by an educational grant from Jazz Pharmaceuticals.

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1199

CLOSING GAPS IN THE EVALUATION AND TREATMENT OF IDIOPATHIC HYPERSOMNIA: RESULTS FROM A QUALITY IMPROVEMENT INITIATIVE

Emily Zyborowicz¹, Thomas Scammell², Rachel Salas³, Jeff Carter¹, Jacqueline Maytorena¹, Laura Simone¹, Cherilyn Heggen¹, Alexandra Garcia-Moreno¹, Larissa Jarzyl¹

¹PRIME Education, ²Department of Neurology, Beth Israel Deaconess Medical Center and Boston Children’s Hospital, Boston, MA, USA, ³Johns Hopkins Medicine

Introduction: Despite advancements in the assessment and management of idiopathic hypersomnia (IH), patients encounter significant delays in diagnosis. Additionally, many patients experience residual symptoms that impact quality of life (QoL). This initiative aimed to examine barriers to IH management and develop practical approaches to address identified needs in care.

Methods: Between May 2024 and July 2025, three US-based sleep clinics participated in a quality improvement initiative. Clinics participated in audit-feedback sessions to evaluate real-world data, identify gaps in evidence-based assessment and management of IH, and develop action plans. Follow-up sessions were held to assess progress and refine action plans. Data was collected through baseline and follow-up clinician surveys and patient chart audits. Patient survey data was collected in collaboration with Hypersomnia Foundation.

Results: Patients’ (N=90) top barrier to IH diagnosis was delays with assessment and referral (32%) and missing appointments (28%). Clinicians’ (N = 54) reported that overlapping symptoms with other conditions was the top challenge to diagnosing IH (51%). Determining the most effective medication or combination of therapies (43%) was clinicians’ top challenge in managing patients’ symptoms. While most clinicians reported assessing treatment response to inform management decisions (64%), only

31% of patient charts (N=80) had follow-up measures such as repeat Epworth Sleepiness scale and other assessments at baseline. Moreover, most patients (69%) feel the burden of IH on QoL was high or very high (Likert 4/5) with many experiencing excessive daytime sleepiness (44%) and sleep inertia (44%) despite treatment. Clinicians' (N=139) set goals to screen and assess for IH earlier, increase follow-up assessment and regularly review treatments. Substantial improvements were observed in the documentation of follow-up measurements as well as counseling and services related to symptoms and QoL on follow-up chart audits (N=90).

Conclusion: This initiative demonstrated actionable strategies to improve IH evaluation, treatment, and follow-up care through evidence- and team-based approaches.

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1200

DELIVERY OF COGNITIVE BEHAVIORAL THERAPY FOR NIGHTMARES (CBT-N) IN PRIMARY CARE MENTAL HEALTH INTEGRATION WITHIN THE VETERANS HEALTH ADMINISTRATION

Courtney Bolstad¹, Constance Fung², Lori Davis¹, Lisa Zubkoff¹, Adam Bramoweth³, Audrey Austin¹, Gerald McGwin¹, Christina Krieg⁴, Katherine Miller⁵

¹Birmingham VA Health Care System, ²Geriatric Research, Education and Clinical Center, VA Greater Los Angeles Healthcare System, ³VA Pittsburgh Healthcare System, ⁴VA Phoenix Health Care System, ⁵Minneapolis Veterans Affairs Health Care System

Introduction: Nightmares are common, undertreated, and linked to various biopsychosocial issues in veterans. To address this clinical need, a provider training and consultation program in Cognitive Behavioral Therapy for Nightmares (CBT-N) was established in 2020 within the Veterans Health Administration (VHA). Program evaluation data indicate that clinicians perceive CBT-N to be beneficial, though they also note barriers to implementation, including the discordance between CBT-N and certain clinical settings. Primary Care Mental Health Integration (PCMHI) is one such setting where brief episodes of care may limit the feasibility of standard CBT-N protocols (e.g., six, one-hour sessions).

Methods: VHA clinicians who received training from CBT-N program experts, including those trained within the past six months, responded to survey outreach in May 2024 (n=65/100) and August 2025 (n=17/28). CBT-N benefits were rated on a 6-point scale. A subset of clinicians (n=15) completed the Acceptability of Intervention Measure, Intervention Appropriateness Measure, and Feasibility of Intervention Measure about the CBT-N treatments in which they were trained. Participants were also encouraged to provide free-text responses, which were reviewed and categorized. Analysis of variance compared scores between PCMHI clinicians and clinicians in other settings.

Results: Results found that PCMHI clinicians (n=13) perceived greater benefits of CBT-N than clinicians in other settings (n=64), yet they faced barriers to implementation like scheduling constraints. A sub-group analysis found that PCMHI clinicians (n=3), compared to clinicians in other settings (n=12), rated CBT-N to be just as acceptable for patients in their clinic (4.50[0.50] vs. 4.65[0.48]; p=.65), but significantly less appropriate for delivery in its current formats (4.00[0.43] vs. 4.73[0.45]; p=.02) and less

feasible to deliver (3.00[0.00] vs. 3.69[0.43]; p=.02). The free-text responses suggested CBT-N is acceptable, increases access to care, and improves patient outcomes, yet remains discordant with the PCMHI model.

Conclusion: These findings are interpreted in light of the study's limitations, such as a small sample size, multiple statistical comparisons, and the cross-sectional design. Nevertheless, these preliminary findings suggest a need to adapt CBT-N for PCMHI. Doing so could expand access to nightmare treatment within the VHA and benefit veterans' mental health.

Support (if any): AASM Foundation 346-SR-24 (KEM)

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1201

OSA TREATMENT ENGAGEMENT: EXAMINING THE IMPACT OF SPLIT-NIGHT PSG REVIEW ON CPAP ADHERENCE AMONG VETERANS

Meagan Charette¹, Smita Rajan¹, Mohammad Al-Ajam²

¹SUNY Downstate Health Sciences University, ²Brooklyn VA Medical Center

Introduction: Obstructive sleep apnea (OSA) disproportionately affects Veterans compared to the average American. This is due to a higher incidence of comorbidities such as PTSD, history of TBI and occupational exposures. Split-night polysomnography (PSG) is a cost-effective tool that is indicated for the diagnosis of OSA in select populations and can accomplish faster time to treatment than the gold standard two-night PSG. Unfortunately, CPAP adherence among Veterans remains low. This review aims to evaluate patient adherence to continuous positive airway pressure (CPAP) therapy following a patient-centered review of split-night PSG.

Methods: A prospective observational study was performed at the VA Hospital in Brooklyn, NY on patients undergoing a split-night PSG vs traditional two-night PSG. All patients received a standardized review of their own PSG measurements. Compliance reports were then followed for 90 days. CPAP adherence metrics were reviewed at 30 and 90 days after counseling. Adherence outcomes were compared before and after split-night review.

Results: Veterans who received PSG review and counseling were more likely to seek out assistance with CPAP material and supply issues, although adherence rates did not improve significantly after counseling.

Conclusion: Veterans who received split-night PSG counseling did not demonstrate improved CPAP adherence. While the split-night review approach appeared to correlate with more incentive for treatment, it did not translate to higher adherence. Despite efficiency, strategies beyond counseling may be necessary to improve long term adherence in a high-risk population.

Support (if any):

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1202

RECONSTRUCTING THE PAP THERAPY JOURNEY USING REDDIT: STAGE-SPECIFIC TOPICS AND EMOTIONAL PATTERNS

Vy Vuong, Caleb Woodford, Kimberly Sterling, Leanne Kaye
Resmed Science Center

Introduction: Online forums like Reddit are popular among people seeking information and support for chronic health conditions,

including obstructive sleep apnea (OSA). Experiences with Positive Airway Pressure (PAP) - the first-line therapy for OSA - vary greatly and are often influenced by clinical, behavioral and emotional factors. This study explored distinct topics and emotions emerging across the PAP therapy journey, including pre-therapy, therapy initiation, and therapy persistence.

Methods: Text data were collected weekly from r/SleepApnea and r/CPAP from March to August 2025. De-identified data were analyzed using three components: therapy stage classification, topic modeling, and emotion classification. Traditional machine learning models and a transformer-based DistilRoBERTa model were trained or fine-tuned to classify therapy stages. Topic modeling using BERTopic to group semantically similar content, extract keywords and representative texts, with OpenAI GPT-4.0-mini generating human-interpretable labels. Emotions were identified by a transformer model pre-trained on the GoEmotions dataset. Human review refined the initial labeling used for model training and the validation of topic labels and representative examples.

Results: We examined 9,623 unique discussions, divided into 13,975 segments that combined same-stage sentences for more precise topic modeling. Of these segments, 4,560 (32.6%) were classified as pre-therapy, 4,062 (29.1%) as therapy initiation, 3,151 (22.5%) as therapy persistence, and 2,202 (15.8%) as unknown. Distinct topics emerged at each stage, while emotional tone remained relatively consistent. Pre-therapy posts focused on symptom burden, challenges navigating diagnostic and sleep study processes, uncertainty and conflicting readings from home monitoring technologies, health insurance issues, and alternative treatments. Therapy-initiation discussions emphasized mask fit, technical troubleshooting, therapy adjustment, and device comparisons. Therapy-sustained-use focused on equipment replacement and maintenance timelines, long-term mask fit, ongoing symptoms, pressure optimization, and interpreting CPAP or wearable data. Across stages, discussions were most often classified as neutral, curiosity, and realization, reflecting a focus on information exchange and problem-solving. Confusion appeared as the main negative emotion, and gratitude was the most consistent positive tone.

Conclusion: Stage-specific insights and emotions revealed how needs, concerns, and behaviors shifted through the PAP therapy journey. This work highlights opportunities for personalized, stage-specific support to improve therapy experiences and promote long-term adoption and use.

Support (if any): Resmed

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1203

THE ROLE OF SOCIAL VULNERABILITY IN MODERATING TREATMENT OUTCOMES OF THE TRANSDIAGNOSTIC INTERVENTION FOR SLEEP AND CIRCADIAN DYSFUNCTION (TSC)

Sophia Oliver¹, Anne Milner¹, Phuc Nguyen¹, Andreas Vindenes², Keanan Joyner¹, Allison Harvey¹

¹University of California, Berkeley, ²University of Oslo

Introduction: Social vulnerability, encompassing exposure to systemic inequities, reflects the disadvantage that individuals face. It has previously been linked to poorer sleep, disrupted circadian rhythms, and increased prevalence of serious mental illness (SMI). Socially vulnerable populations also face substantial barriers to

accessing and engaging in evidence-based psychological treatments, reducing reach and widening mental health disparities. Despite growing recognition of these inequities, little research has examined whether social vulnerability moderates treatment outcomes. The present study evaluates how social vulnerability influences treatment outcomes of the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TSC) in community mental health centers, including an Adapted version of TSC to reduce treatment burden and fit client contexts.

Methods: Data were pooled across two randomized controlled trials evaluating Standard and Adapted TSC (N = 636). Participants who met the criteria for SMI and sleep/circadian disturbance completed assessments at pre-treatment, post-treatment, and six-month follow-up. The Social Vulnerability Index (SVI) measured the degree of disadvantage across subdomains: socioeconomic; household composition/disability; minoritized racial group/language; and housing/transportation. Multilevel models assessed whether subdomains moderated treatment effectiveness across time for various clinical outcomes.

Results: SVI subdomains moderated the effects of Adapted versus Standard TSC on psychiatric symptoms and functional impairment. For psychiatric symptoms, higher socioeconomic (b = 3.95, SE = 1.64, p = .016) and housing/transportation (b = 3.85, SE = 1.75, p = .027) vulnerability were associated with greater variability in outcomes in Standard TSC, whereas Adapted TSC showed more consistent gains across levels of vulnerability over time. Functional impairment showed a similar pattern, with more consistent improvement in Adapted TSC relative to Standard for socioeconomic (b = 1.23, SE = 0.56, p = .029) and housing/transportation (b = 1.64, SE = 0.62, p = .008) vulnerability.

Conclusion: These findings suggest that social vulnerability subdomains may influence response to TSC in community health settings. While not all subdomains moderated outcomes, the Adapted condition demonstrated more equitable improvements across levels of socioeconomic and housing/transportation vulnerability. This is important because tailoring interventions to better match client contexts may enhance engagement and improve clinical outcomes.

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1204

ACCEPTABILITY AND FEASIBILITY OF INTEGRATING BEHAVIORAL SLEEP MEDICINE INTO HGNS PROGRAM

Christopher Crawford¹, Aubrey Shell², Michelle Williams³, Stephanie Stahl⁴, Shalini Manchanda⁴, Noah Parker⁴, Yelena Chernyak²

¹Indiana University Indianapolis, ²Indiana University Health,

³University of Chicago, ⁴Indiana University School of Medicine

Introduction: Obstructive sleep apnea (OSA) is common and contributes to substantial medical and societal burden. Continuous positive airway pressure is the standard treatment, yet adherence is often reduced by equipment discomfort, medical conditions, and psychological symptoms. Hypoglossal nerve stimulation (HGNS) offers an alternative for individuals who do not tolerate continuous positive airway pressure. Behavioral and psychosocial factors also influence HGNS use, suggesting a role for integrated care. Real-world data describing patients referred

to interdisciplinary HGNS programs remain limited. This study describes the development of an interdisciplinary HGNS service line and presents baseline characteristics for all referrals during its first two years.

Methods: The service line was implemented at an academic medical center and included otolaryngology, sleep medicine, and behavioral sleep medicine (BSM). Otolaryngology completed intake visits and administered screening measures. Patients were referred to BSM when scores exceeded clinical thresholds on the Insomnia Severity Index (ISI), Generalized Anxiety Disorder-7, or Patient Health Questionnaire-9. BSM evaluations assessed insomnia, psychiatric symptoms, medication use, sleep behaviors, and treatment needs. Clinical and demographic data were extracted from electronic records for all patients referred 2021-2023.

Results: Forty-eight patients were referred, 39.6% pre-implant and 60.4% post-implant. Patients were mostly male (62.5%) and White (95.8%), with a mean age of 58.5 years. Insomnia was common, with 85.4% receiving a clinical diagnosis and showing moderate ISI scores. Depression was identified in 50% of patients and anxiety in 18.8%. Cognitive behavioral therapy for insomnia was recommended in 87.5% of cases, and the majority of patients (68.8%) attended at least one follow-up. For those who attended any follow-up sessions, mean attendance was higher for those referred post-implantation ($M = 4.7$, $SD = 2.3$) than those referred pre-implantation ($M = 3.1$, $SD = 2.5$), a difference that approached significance ($p = 0.09$). HGNS use was similar between groups, with the sample averaging use on 82.5% of nights for 5.8 nightly hours. Patients referred after implantation exhibited more nightly pauses than those referred before implantation ($p = .09$).

Conclusion: Findings demonstrate high insomnia prevalence, frequent psychiatric symptoms, and strong engagement with behavioral treatment when delivered within an interdisciplinary HGNS service.

Support (if any): None

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1205

FEASIBILITY OF SLEEP HYGIENE-BASED MULTIDISCIPLINARY SLEEP MANAGEMENT GUIDED BY NON-CONTACT MONITORING IN A LONG-TERM CARE FACILITY

Mitsunori Kobayashi

Medical Corporation Bishinkai Kurosawa Hospital

Introduction: Sleep disturbances are highly prevalent among residents of long-term care facilities and are frequently driven by circadian disruption, environmental stimulation, and inconsistent care practices. Although sleep hygiene is a fundamental component of sleep medicine, its structured and sustained implementation in institutional settings remains limited, partly due to the lack of objective feedback and specialist supervision. This pilot study evaluated the feasibility of a sleep hygiene-centered, multidisciplinary sleep management model guided by continuous non-contact sleep monitoring in a geriatric care facility.

Methods: An observational feasibility study was conducted in a long-term care facility using a non-contact sleep monitoring system (Paramount Bed Connect®). Three residents with persistent nocturnal sleep fragmentation were longitudinally monitored. Objective sleep-related parameters, including nocturnal sleep duration, sleep fragmentation, and day-night activity patterns, were continuously assessed. The intervention was centered

on sleep hygiene education and implementation, designed and supervised by a board-certified sleep dentist and delivered by trained long-term care staff. Sleep hygiene components included regulation of nocturnal light and television exposure, optimization of bathing timing, enhancement of daytime activity, regularization of daily schedules, reduction of nighttime stimulation, and oral care-related guidance such as nighttime denture management. Changes in sleep patterns before and after intervention were descriptively analyzed.

Results: Across all participants, monitoring data demonstrated consistent trends toward improved nocturnal sleep consolidation following the intervention. Reductions in nighttime awakenings and clearer differentiation between daytime and nighttime activity were observed. Objective sleep visualization facilitated timely identification of sleep-disrupting factors and supported coordinated care adjustments among nursing, caregiving, and oral care staff. The monitoring-guided sleep hygiene approach was feasible to implement and well integrated into routine care workflows.

Conclusion: This pilot study demonstrates the feasibility of a sleep hygiene-based, multidisciplinary sleep management model guided by non-contact monitoring in a long-term care setting. The findings highlight the importance of structured sleep hygiene education as a core, non-pharmacological strategy and underscore the role of sleep-trained dental specialists in supervising and operationalizing sleep hygiene interventions within institutional care teams. Larger studies are warranted to evaluate the clinical effectiveness of this approach in improving sleep quality and circadian organization among institutionalized older adults.

Support (if any):

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1206

OPERATIONAL IMPACT OF AI-DERIVED AHI ON INCONCLUSIVE HSAT STUDIES: SEX-SPECIFIC RECLASSIFICATION IN 3094 HOME TESTS

Jón Ágústsson¹, Rósa Hugosdóttir¹, Megan McPhee¹, Frances Thorndike², Samantha Edington², Jason Ong², Sinan Baran², Scott Sands³, Heidi Riney²

¹Nox Research, Nox Medical ehf, ²Nox Health, ³Harvard University

Introduction: Home sleep apnea testing (HSAT) typically reports a respiratory event index (REI, events/hour of monitoring) rather than apnea-hypopnea index (AHI, events/hour of sleep). REI underestimates disease severity, particularly for arousal-based hypopneas common in women, leaving symptomatic patients with inconclusive results ($REI < 5$) that prompt repeat testing or loss to follow-up. We evaluated how an FDA-cleared AI system that derives AHI from HSAT signals changes HSAT classification, with emphasis on sex differences.

Methods: We retrospectively analyzed 3094 adult HSATs (1785 men; 1147 women) from a single sleep center. REI came from routine clinical processing. AHI was computed from the same signals by DeepRESP v2.0 (K252330), an FDA-cleared SaMD for sleep staging, arousal detection, and respiratory scoring. REI and AHI were categorized as < 5 , 5–14.9, 15–29.9, and ≥ 30 events/hour. We cross-tabulated REI versus AHI overall and by sex, focusing on reclassification of $REI < 5$ and $REI < 15$ relative to AHI-defined moderate-severe disease.

Results: By REI, 351/3094 studies (11.3%) were < 5 , including 122/185 men (6.8%) and 205/1147 women (17.9%); with AI-derived

AHI, only 36/351 (10.3%) remained < 5 . Reclassification from $REI < 5$ to $AHI \geq 5$ occurred in 113 men (6.3% of all men) and 178 women (15.5% of all women), so nearly one in six women had an REI-negative HSAT that became AHI-positive. Among patients with $AHI \geq 15$, 727/2374 (30.6%) had $REI < 15$, affecting 27.4% of men (411/1499) and 37.4% of women (283/756).

Conclusion: AI-derived AHI converted most REI-negative HSATs into positive or higher-severity studies, and women with REI values just below diagnostic thresholds were more often moved into higher severity categories. These findings suggest that REI alone disproportionately underestimates disease burden in women, whereas automated AHI reduces inconclusive HSATs and may streamline diagnostic pathways; effects on repeat testing and treatment require prospective evaluation.

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1207

AUTOMATED DETECTION OF SLEEP OPPORTUNITY START AND END FROM POLYSOMNOGRAPHY SIGNALS

Michiru Kaneda¹, Sho Ogaki¹, Tomoyuki Nohara¹, Syuhei Fujita¹, Naoshi Osako¹, Tomoko Yagi², Takanori Ogata¹

¹ACCELStars, Inc., ²Kurume University

Introduction: In clinical polysomnography (PSG), technicians routinely document lights off and lights on timings to define the sleep opportunity window, which serves as the reference for calculating metrics such as Total Dark Time (TDT) and Sleep Latency (SL). TDT is used for computing Sleep Efficiency when Time in Bed is not available. However, these metadata are often missing or inconsistently recorded, particularly in retrospective datasets or unattended studies. When such marks are unavailable, the boundaries of the sleep opportunity must be inferred retrospectively from physiological signals. This study investigates whether these boundaries can be estimated directly from PSG dynamics using an automated classification framework.

Methods: PSG recordings from 473 healthy participants and 244 individuals evaluated for suspected sleep-disordered breathing were analyzed. A decision-tree-based classifier originally developed for five-stage sleep scoring was extended to include a sixth label indicating epochs outside the sleep opportunity. Features derived from electroencephalography, electrooculography, and electromyography were computed for each 30-second epoch. The sleep opportunity start was defined as the first point at which N successive non-zero epochs, representing physiologically plausible sleep-wake stages, appeared. The end was determined analogously by scanning the record backward. The threshold N was selected by maximizing agreement with technician-recorded boundaries across cross-validation folds.

Results: The optimal threshold was obtained when fourteen successive non-zero epochs were required to define the start and end of the sleep opportunity window. Under this condition, the mean differences (root mean squared error) were 0.003 (0.509) hours for TDT and -0.044 (0.257) hours for SL. These findings indicate

close correspondence between inferred and technician-defined boundaries.

Conclusion: The results demonstrate that a simple continuity-based criterion applied to sleep-stage predictions enables accurate estimation of sleep opportunity boundaries directly from PSG signals. This approach provides a practical solution when explicit lights off/on annotations are unavailable and supports reliable computation of sleep timing metrics within automated scoring workflows and large-scale retrospective analyses.

Support (if any):

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1208

INTEGRATING DIGITAL CBT-I INTO A COMPREHENSIVE VALUE-BASED TELEHEALTH SLEEP SERVICE

Jason Ong¹, Rebecca Hankla¹, Kristin Beck¹, Sinan Baran¹, Lee Ritterband², Frances Thorndike¹, Heidi Riney¹

¹Nox Health, ²University of Virginia

Introduction: Value-based care is a disruptive healthcare delivery model emphasizing patient outcomes and cost-effectiveness rather than volume of service. While this model has been applied to the treatment of obstructive sleep apnea (OSA), it has not yet been examined for chronic insomnia. This study examined preliminary real-world data for integrating an FDA-cleared digital cognitive behavioral therapy for insomnia (dCBT-I) into a value-based telehealth sleep service.

Methods: Data were collected as part of ongoing clinical care from patients presenting to a comprehensive value-based sleep service between January 1 and November 30 2025. Following an initial telehealth visit with a board-certified sleep physician, patients diagnosed with insomnia were offered access (as appropriate) to Somryst, an FDA-cleared, automated, 6-session dCBT-I program supported by a care team trained to provide patient assistance. Renewals were granted as needed after the 9-week prescription for up to 12 months. Patients suspected of OSA received a home sleep apnea test and those who tested positive for OSA were subsequently offered positive airway pressure (PAP) therapy complemented by telehealth monitoring and patient support with supplies as needed for 12 months. All patient contact were completed remotely.

Results: Out of 603 patients diagnosed with insomnia and offered dCBT-I, 350 enrolled in treatment (58.0%) and 253 (42.0%) were still in progress or lost to follow-up. Those enrolled in treatment ($M=50.3$ years) were significantly older relative to those still in progress or lost to follow-up ($M=45.6$ years), $p<.05$. Among those enrolled in treatment, 89 (25.4%) received dCBT-I only, 105 (30.0%) received dCBT-I and PAP, and 156 (44.6%) received PAP only. Patients who received both dCBT-I and PAP ($M=52.5$ years) were significantly older than patients who received dCBT-I only ($M=48.4$ years), $p<.05$. No significant differences were found on gender or ethnicity.

Conclusion: Preliminary findings support the feasibility of a fully-connected value-based sleep service featuring dCBT-I and PAP delivered using virtual care. Specifically, the findings indicate the potential use of dCBT-I concurrently with PAP, which could be particularly important for improving outcomes in older patients with comorbid insomnia and sleep apnea (COMISA).

Support (if any): Funding was provided by Nox Health.

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1209

PRESENCE OF A BED PARTNER ASSOCIATED WITH ENDORSEMENT OF SLEEP DISORDERS SYMPTOMS: DATA FROM THE ONLINE SLEEP HEALTH SCREENING PROJECT

Suzanne Gorovoy¹, Katherine Barlis², Daniel Cohen², Rina Fox², Michael Perlis³, Julie Flygare⁴, William Killgore², Michael Grandner²

¹University of Arizona College of Medicine, ²University of Arizona, ³University of Pennsylvania, ⁴Project Sleep

Introduction: The presence of a bed partner can influence sleep, but little is known about how bed sharing relates to the self-reporting of clinical sleep disorder symptoms. On one hand, bed partners may help stabilize sleep routines and identify potential symptoms such as snoring or breathing pauses; on the other, partner presence could alter subjective awareness or reporting patterns. Understanding these associations could inform both clinical screening practices and the interpretation of self-reported sleep health data.

Methods: Participants completed an online sleep health screener that is available to the public (<https://sleephealthscreen.com>). This consists of the Sleep Disorders Symptom Check List (SDSCL), which includes 25 items related to sleep disorder symptoms. Presence of a bed partner was asked as “Do you regularly have a bed partner (>3 days/week)?” All consecutive responses to the questionnaire were included, following cleaning for duplicate and invalid entries. Ordinal regression analyses were adjusted for age, sex, race/ethnicity, work hours, and work shift.

Results: A total of 3,091 individuals provided complete data. Those with a bedpartner were less likely to endorse insufficient sleep (oOR=0.75), irregularity (oOR=0.57), difficulty falling asleep (oOR=0.56), staying asleep (oOR=0.73), and early morning awakenings (oOR=0.84), fatigue (oOR=0.60), phase delay (oOR=0.54), sleepiness (oOR=0.85), cataplexy-like symptoms (oOR=0.78), sleep hallucinations (oOR=0.77), sleep paralysis (oOR=0.77), nightmares (oOR=0.80), sudden awakenings (oOR=0.78), and sleep problems interfering with functioning (oOR=0.62) and more likely to report more snoring (oOR=1.51), loud snoring (oOR=2.05), and breathing pauses (oOR=1.31).

Conclusion: Adults with a regular bed partner reported fewer insomnia-related symptoms and better-perceived sleep regularity but were more likely to endorse snoring and breathing pauses—symptoms that are often observed by others rather than self-perceived. These findings suggest that bed partners may enhance the detection of sleep-disordered breathing while potentially reducing the subjective perception or reporting of insomnia-related difficulties. Clinically, this pattern underscores the importance of incorporating collateral information from partners in both clinical assessments and population screening tools. Community-based sleep health initiatives and digital screeners could also leverage brief items about partner observations to improve identification of individuals at risk for sleep apnea or

other disturbances that may go unnoticed in self-report-only contexts.

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1210

EMPLOYMENT STATUS AND WORK SHIFT ASSOCIATED WITH ENDORSEMENT OF SLEEP DISORDERS SYMPTOMS: DATA FROM THE ONLINE SLEEP HEALTH SCREENING PROJECT

Katherine Barlis¹, Daniel Cohen¹, Michael Perlis², Julie Flygare³, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Pennsylvania, ³Project Sleep

Introduction: While shift work is linked to sleep disruption, less is known about the impact specific work characteristics on clinical sleep symptoms. We examined whether employment status and schedule were associated with different sleep disorder symptom reports.

Methods: Participants completed an online sleep health screener that is posted online and available to the public (<https://sleephealthscreen.com>). This consists of the Sleep Disorders Symptom Check List (SDSCL), which includes 25 items related to sleep disorder symptoms, rated as “Never,” “Once a month,” “1-2 times a week,” “3-4 times a week,” or “5-7 times a week.” Employment and work shift was addressed with an item where respondents indicated whether they primarily worked a day shift (9am-5am), morning shift (4am-12pm), night shift (12am-8am), multiple shifts, if they worked from home, if they were retired, or if they were unemployed. All responses are anonymous. All consecutive responses to the questionnaire were included, following cleaning for duplicate and invalid entries. Ordinal regression analyses were adjusted for age, sex, race/ethnicity, work hours, and presence of a bed partner.

Results: A total of 3,091 individuals provided complete data. Compared to people who generally work a day shift (9am-5am), those working morning hours (4am-12pm) were more likely to endorse insufficient sleep, irregularity, and phase advance. Those working night shift (12am-8am) were more likely to report difficulty falling asleep and early morning awakenings, more fatigue, and more interference with functioning. They were less likely to report bruxism. Those who report that they primarily work from home were less likely to endorse insufficient sleep but more likely to report difficulty falling asleep and staying asleep and early morning awakenings, more fatigue, sleepiness, dry mouth, breathing pauses, gasping, uncomfortable sensations in legs, urge to move legs, frequent awakenings, and more interference with functioning. Those working multiple shifts across the day reported more bruxism. Retired individuals were more likely to report insufficient sleep.

Conclusion: Although night shift work has become recognized as having adverse impacts on sleep, more research is needed to

explore whether working early morning hours and working from home adversely impact sleep health.

Support (if any): R01MD011600, R01MH135978

Abstract citation ID: zsag091.1210

1211

HABITUAL SLEEP DURATION ASSOCIATED WITH ENDORSEMENT OF SLEEP DISORDERS SYMPTOMS: DATA FROM THE ONLINE SLEEP HEALTH SCREENING PROJECT

Dorothy Tung¹, Katherine Barlis¹, Michael Amadei¹, Daniel Cohen¹, Michael Perlis², Julie Flygare³, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Pennsylvania, ³Project Sleep

Introduction: Specific sleep disorders symptoms most strongly associated with reduced sleep time in a real-world setting are not well characterized. Hence, this study analyzes data from a screening questionnaire to explore how the frequency of common sleep symptoms relates to self-reported sleep duration.

Methods: Participants completed an online sleep health screener (<https://sleephealthscreen.com>). This consists of the Sleep Disorders Symptom Check List (SDSCL), as well as several questions establishing respondent characteristics. All responses are anonymous. All consecutive responses to the questionnaire were included, following cleaning for duplicate and invalid entries. Responses to symptom items were recoded as "Never," "Sometimes (< 3 times per week)" or "Often (3 or more times per week)." Sleep duration was self-reported in hours and minutes. Regression analyses were adjusted for age, sex, race/ethnicity, work hours, employment, and presence of a bed partner.

Results: A total of 3,030 individuals provided complete data. Shorter sleep duration was observed for those who report insufficient sleep Often (-60.7mins), sleep irregularity Often (-34.6mins), difficulty falling asleep Often (-57.7mins), difficulty staying asleep Sometimes and Often (-20.9mins and -94.9 mins, respectively), and difficulty with early morning awakenings Sometimes and Often (-19.1mins and -92.1mins, respectively), fatigue Often (-28.2mins), sleepiness Sometimes (-9.3mins), phase advance Sometimes and Often (-51.1mins and -31.3mins, respectively), snoring Often (-13.9 mins), dry mouth Often (-21.4mins), loud snoring Often (-14.3 mins), observed breathing pauses Often (-19.2mins), waking up choking or gasping Often (-32.6mins), uncomfortable sensations in legs at night Often (-19.6 fewer mins), urge to move legs at night Often (-21.1mins), frequent awakenings Sometimes and Often (-11.8mins and -65.7mins, respectively), cataplexy-like symptoms Often (-26.4mins), sudden awakenings Sometimes and Often (-9.0mins and -30.2mins, respectively), parasomnia-like symptoms Often (-15.3mins), sleep interfering with functioning Sometimes and Often (-23.7mins and -39.9mins, respectively). Phase delay, sleep hallucinations, sleep paralysis, nightmares, and bruxism were not associated with sleep duration.

Conclusion: Frequent insomnia-related symptoms are most strongly associated with shorter self-reported sleep duration, though symptoms consistent with sleep disorders such as sleep apnea, restless legs syndrome, and narcolepsy are also associated. These results highlight the value of utilizing broad symptom

screeners for identifying individuals at risk for clinically significant sleep loss.

Support (if any): R01MD011600, R01MH135978

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1212

HABITUAL SLEEP EFFICIENCY ASSOCIATED WITH ENDORSEMENT OF SLEEP DISORDERS SYMPTOMS: DATA FROM THE ONLINE SLEEP HEALTH SCREENING PROJECT

Michael Amadei¹, Katherine Barlis¹, Dorothy Tung¹, Daniel Cohen¹, Michael Perlis², Julie Flygare³, Azizi Seixas⁴, Girardin Jean-Louis⁴, Michael Grandner¹

¹University of Arizona, ²University of Pennsylvania, ³Project Sleep, ⁴University of Miami

Introduction: Low sleep efficiency is a clinically valuable marker of poor sleep, especially in insomnia. Less is known about real-world associations between sleep efficiency and other sleep disorders symptoms.

Methods: Participants completed an online sleep health screener (<https://sleephealthscreen.com>). This consists of the Sleep Disorders Symptom Check List (SDSCL), as well as several other questions establishing demographics and respondent characteristics. All responses are anonymous. All consecutive responses to the questionnaire were included, following cleaning for duplicate and invalid entries. Responses to symptom items were recoded as "Never," "Sometimes (< 3 times per week)" or "Often (3 or more times per week)." Sleep efficiency was calculated as [TST/TIB]*100 for self-reported habitual values. Regression analyses were adjusted for age, sex, race/ethnicity, work hours, employment, and presence of a bed partner.

Results: A total of 3,030 individuals provided complete data. Higher sleep efficiency was associated with insufficient sleep Sometimes (+1.59%) and sleepiness Sometimes (+2.0%). Lower sleep efficiency was observed for those who report insufficient sleep Often (-2.5%), sleep irregularity Sometimes and Often (-2.0% and -8.1%, respectively), difficulty falling asleep Sometimes and Often (-3.6% and -16.3%, respectively), difficulty staying asleep Sometimes and Often (-3.6% and -17.5%, respectively), and difficulty with early morning awakenings Sometimes and Often (-3.3% and -15.3%, respectively), fatigue Often (-7.3%), phase advance Sometimes and Often (-2.3% and -3.1%, respectively), phase delay Sometimes and Often (-1.5% and -4.0%, respectively), snoring Often (-1.9%), dry mouth Often (-3.7%), uncomfortable sensations in legs at night Often (-5.7%), urge to move legs at night Sometimes and Often (-1.7% and -5.2%, respectively), frequent awakenings Sometimes and Often (-3.4% and -13.4%, respectively), cataplexy-like symptoms Often (-5.8%), sleep hallucinations Sometimes and Often (-2.5% and -4.9%, respectively), nightmares Sometimes and Often (-2.0% and -5.0%, respectively), sudden awakenings Sometimes and Often (-3.4% and -6.9%, respectively), parasomnia-like symptoms Often (-2.3%), sleep interfering with functioning Sometimes and Often (-5.3% and -11.0%, respectively). Loud snoring, observed breathing pauses, waking up choking or gasping, sleep paralysis, and bruxism were not associated with sleep efficiency.

Conclusion: Sleep efficiency is negatively associated with a wide range of sleep disorders symptoms, beyond insomnia.

Support (if any): R01MD011600, R01MH135978

Abstract citation ID: zsag091.1212

1213

HOME VS. LAB POLYSOMNOGRAPHY WITH A PATCH-BASED SYSTEM: LONGER, MORE EFFICIENT SLEEP AT HOME WITHOUT RESPIRATORY TRADE-OFFS

Christoph Schobel¹, Christian Viniol², Wolfgang Galetke³, Holger Woehrle⁴, Georg Nilius⁵, Winfried Randerath⁶, Hartmut Schnieder⁷

¹Universitätsmedizin Essen Ruhrlandklinik,

²Universitätsklinikum Gießen und Marburg GmbH, ³VAMED Hospital Hagen-Ambrock, ⁴Lungenzentrum Ulm, ⁵KEM | Evang. Kliniken Essen-Mitte, ⁶Krankenhaus Bethanien, ⁷American Sleep Clinic

Introduction: Polysomnography (PSG) performed in sleep laboratories is the diagnostic gold standard, but laboratory schedules, unfamiliar surroundings, and equipment burden may distort natural sleep. Home PSG systems could capture more representative sleep while preserving full signal fidelity. The Onera Sleep Test System (STS) is a patient applied, patch-based, type II PSG system, which enables studies to be performed unattended at the patient's home. Sleep timing, architecture, respiratory indices and the patients' experience using the patch-based device were compared in the home and laboratory environments.

Methods: In a two-phase, multicenter study across seven German sleep clinics, adults referred for PSG first underwent in-lab patch-based PSG (N=344) and eligible participants then completed a home PSG within one week (N=204). A subset of studies (N=52) had a full lab and home sleep night for a comparison of sleep and respiratory metrics

Results: Differences in sleep patterns were found between the two environments (lights-off 23:00 home vs 22:10 lab; lights-on 06:33 home vs 05:33 lab). In the scored subset, home nights showed longer total sleep time (409.5 ± 74.5 vs 378.2 ± 71.8 min, $p=0.033$), more REM sleep (91.1 ± 28.1 vs 76.7 ± 28.4 min, $p=0.024$) and more REM cycles (5.04 ± 1.76 vs 4.33 ± 1.70 , $p=0.049$), higher sleep efficiency ($88.9\% \pm 9.0$ vs $80.9\% \pm 11.9$, $p < 0.001$), lower WASO (24.3 ± 24.1 vs 54.8 ± 45.1 min, $p < 0.001$), shorter REM onset latency (85.5 ± 47.7 vs 108.2 ± 64.7 min, $p=0.008$), and a lower arousal index (1.86 ± 1.64 vs 2.89 ± 2.11 , $p=0.003$). Respiratory metrics and body position did not differ significantly between settings. 73% of subjects indicated that their sleep in the lab was "worse than home". Device feedback was favorable: 84% judged size "just right," 6% reported any concerns, 67% reported no issues at home, and 92% felt confident placing the device.

Conclusion: These findings support home PSG to obtain more representative sleep architecture without compromising detection of sleep-disordered breathing.

Support (if any): The study was funded by Onera Health and managed by the CRO Maxis Medical.

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1214

IMPROVING ACCESS TO CARE THROUGH ELECTRONIC CONSULTS AND A DIRECT-TO-TESTING PATHWAY

Kathleen Sarmiento¹, Charles Atwood², Eilis Boudreau³, Connor Smith³, Annette Totten³, Alexander Gomez⁴, Priyanka Chilakamarri¹, Linda Ortiz Deboque⁵, Kaylea Flick², Cheryl Dutka², Julia von Oppenfeld⁴, Robert Folmer⁵

¹University of California San Francisco, ²VA Pittsburgh Healthcare System, ³Oregon Health Sciences University, ⁴San Francisco VA Healthcare System, ⁵Portland VA Healthcare System

Introduction: The prevalence of obstructive sleep apnea (OSA) among Veterans is rising, placing increasing demand on the Veterans Health Administration (VHA) and its limited sleep medicine resources. Because access to sleep specialists often constrains timely care, innovative models are needed to streamline OSA diagnosis and treatment. Currently, Medicare and most insurers mandate an in-person or virtual evaluation by a physician or licensed provider before home sleep testing and/or initiation of therapy. The "De-implementation of the Initial Provider Encounter for Diagnosis and Treatment of Obstructive Sleep Apnea: The DREAM (Direct Referral for Apnea Monitoring) Project" evaluates whether replacing the initial sleep provider visit with an electronic chart review or e-consult (the DREAM pathway) improves timeliness to diagnostic testing and initiation of positive airway pressure (PAP) therapy compared with the traditional care pathway.

Methods: This pragmatic study was conducted across three VA sleep medicine programs (San Francisco, CA; Portland, OR; and Pittsburgh, PA). Veterans referred for evaluation of suspected OSA were followed from the point of referral through diagnostic testing and PAP initiation. Participants were assigned to either the Traditional pathway, which included an initial sleep provider visit, or the DREAM pathway, which omitted this step and substituted an electronic chart review or e-consult. The primary outcomes were time from referral to sleep testing and time from referral to PAP initiation. Group comparisons were made using appropriate statistical tests.

Results: A total of 1,215 Veterans were included: 921 in the DREAM pathway and 294 in the Traditional pathway. The mean time from referral to sleep testing was 120.4 days (SD=107.8) for DREAM versus 216.1 days (SD=136.9) for Traditional care ($p < 0.0001$). The mean time from referral to PAP initiation was 192.6 days (SD=108.1) for DREAM and 252.7 days (SD=121.4) for Traditional care ($p < 0.0001$).

Conclusion: Preliminary findings demonstrate that substituting the initial sleep provider encounter with an electronic chart review or e-consult substantially improves timeliness to both diagnostic testing and PAP therapy initiation. Ongoing analyses will examine site-level variation, PAP adherence, and patient satisfaction to inform broader implementation within the VHA network.

Support (if any): This work was supported by VA HSR&D Service Merit Award #IIR 15-339.

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1215

IMPROVING ISI DOCUMENTATION THROUGH PRE-VISIT ELECTRONIC QUESTIONNAIRE COMPLETION IN A VA TELEMEDICINE SLEEP CLINIC

Emma Lipshultz¹, Ivan Escalona Puig¹, Snigdha Ila¹, Hao Cheng², Alexandre Abreu³, Kori Ascher³, Eric Geil²

¹University of Miami/Miami VA Medical Center, ²Miami VA Medical Center, ³University of Miami

Introduction: Insomnia is common among patients evaluated in sleep clinics, and standardized assessment is essential for

guiding evidence-based management, including referral for cognitive behavioral therapy for insomnia (CBT-I). The Insomnia Severity Index (ISI) is a validated instrument for assessing symptom severity and treatment response. However, in telemedicine settings, in-visit ISI administration can be time-consuming and inconsistently completed. This quality-improvement initiative evaluated whether pre-visit electronic delivery of the ISI via the Veterans Affairs (VA) Mental Health Assistant (MHA) platform would improve questionnaire completion and availability at the point of care.

Methods: The intervention was implemented in fellow-led sleep telemedicine clinics at a VA Medical Center. From August 20, 2025 to November 7, 2025, patients scheduled for telemedicine visits received an electronic ISI via secure text and email through the MHA tool on the Monday before their appointment. ISI completion rates were prospectively recorded. Baseline ISI availability was assessed through retrospective chart review of encounters conducted between January 1 and June 30, 2025 in the same clinics. Primary outcomes included pre-visit ISI completion during the intervention period and documented ISI availability in the pre-intervention cohort.

Results: During the intervention period, 133 patients were scheduled and 104 attended. Seventy-one patients completed the ISI in advance, corresponding to a 53.4% completion rate among scheduled patients (95% CI: 44.9–61.9) and a 68.3% completion rate among those who attended (95% CI: 59.3–77.2). In the pre-intervention chart review of 234 encounters, ISI documentation was present in 32.9% (77/234; 95% CI: 26.9–38.9). This corresponds to a 35.4% increase in ISI availability at the visit compared with baseline. Clinicians informally noted that pre-visit completion reduced the need for in-visit questionnaire administration and improved perceived visit flow.

Conclusion: Pre-visit electronic administration of the ISI via the VA MHA platform significantly improved standardized insomnia assessment in a telemedicine sleep clinic. This scalable workflow enhancement increased data availability at the point of care and may facilitate more consistent, guideline-concordant insomnia management.

Support (if any):

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1216

PUBLIC DEPICTIONS OF SLEEP TESTING: EMOTIONAL TONE AND THEMATIC PATTERNS ON SOCIAL MEDIA

Nicholas Shaffer¹, Sonal Malhotra²

¹Baylor College of Medicine, ²Texas Children's Hospital

Introduction: Sleep studies involve extensive wiring, adhesives, and physiologic monitoring, creating a visually striking and unfamiliar medical experience. As patients increasingly share these encounters online, social media provides a unique opportunity to examine how individuals interpret and present a highly medicalized procedure in a public setting. Understanding the emotional and thematic content of these posts may shed light on how patients negotiate vulnerability, manage discomfort, and construct meaning around sleep testing. This study sought to characterize emotional tone, identify common thematic patterns, and assess whether emotional expression varied by testing modality or posting characteristics.

Methods: A retrospective content analysis of 862 posts tagged with the hashtag #sleepstudyselfie on Instagram was conducted. Posts were coded for tone (positive, neutral, mixed/ambivalent, negative), stated meaning, selfie composition, and modality (PSG, HSAT). Theme co-occurrence patterns were examined to identify clusters of emotional expression. Tone-characteristic associations were tested using Chi-square analyses with Cramér's V. Multinomial logistic regression modeled tone as a four-level outcome, and a binary model evaluated predictors of negative tone. Posting year was extracted for temporal context.

Results: Among 516 included posts, mixed or ambivalent tone was most common (33%), reflecting humorous discomfort, mild frustration, and diagnostic curiosity. Captions frequently referenced wires, glue, or "cyborg-like" appearance, suggesting active negotiation of a medicalized body image. Positive and neutral tones each comprised 32%, while negative tone remained uncommon (6%). Theme co-occurrence showed strong clustering among curiosity, frustration, anxiety, and humor (up to 16 co-occurrences), indicating that emotional expression was rarely singular. Emotional tone did not significantly differ by modality ($p=0.267$, $V=0.084$) or posting meaning ($p=0.166$, $V=0.090$). Regression models demonstrated limited explanatory value (pseudo- $R^2 \leq 0.032$).

Conclusion: Online portrayals of sleep testing reveal a distinctive emotional signature: patients experience the sleep study as a complex, layered event shaped by intertwined curiosity, humor, burden, and mild anxiety rather than overt positivity or negativity. Emotional tone was independent of modality and posting structure, suggesting that reactions arise from the inherent nature of the procedure. Social media provides a space where patients reframe an intrusive, equipment-heavy experience through mixed emotional expression.

Support (if any):

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1217

RACIAL/ETHNIC DIFFERENCES IN ENDORSEMENT OF SLEEP DISORDERS SYMPTOMS: DATA FROM THE ONLINE SLEEP HEALTH SCREENING PROJECT

Daniel Cohen¹, Katherine Barlis¹, Michael Perlis², Julie Flygare³, Azizi Seixas⁴, Girardin Jean-Louis⁴, Debbie Chung⁴, William Killgore¹, Michael Grandner¹

¹University of Arizona, ²University of Pennsylvania, ³Project Sleep, ⁴University of Miami

Introduction: Previous research has found that Black, Hispanic, and Asian individuals generally have lower sleep duration, lower sleep quality, and higher sleepiness. Few studies have explored how a wider array of sleep outcomes vary across race/ethnicity.

Methods: Participants completed an online sleep health screener that is available to the public (<https://sleephealthscreen.com>). This consists of the Sleep Disorders Symptom Check List (SDSCL), which includes 25 items related to sleep disorder symptoms. Race/ethnicity categories allowed for multiple selections. Therefore, analyses for each category examined a "Yes" vs "No" endorsement for each, irrespective of endorsement for other categories. All responses are anonymous. All consecutive responses to the questionnaire were included, following cleaning for duplicate and invalid entries. Ordinal regression analyses were adjusted for age, sex, work shift, work hours, and presence of a bed partner.

Results: A total of 3,091 individuals provided complete data. White respondents reported more fatigue, frequent awakenings, sleep hallucinations, sleep paralysis, nightmares, sudden awakenings, parasomnia-like symptoms, bruxism, and sleep interfering with functioning. Black respondents were more likely to report irregularity, more difficulty falling asleep and staying asleep, more fatigue, gasping, frequent awakenings, sleep hallucinations, sleep paralysis, sudden awakenings, parasomnia-like symptoms, and sleep interfering with functioning. Hispanic/Latino respondents were more likely to report insufficient sleep, irregularity, difficulty falling asleep and staying asleep and early morning awakenings, more fatigue, morning dry mouth, breathing pauses, frequent awakenings, cataplexy-like symptoms, sleep hallucinations, sleep paralysis, nightmares, sudden awakenings, bruxism, and sleep interfering with functioning. Asian respondents were less likely to report difficulty staying asleep and early morning awakenings, and more likely to report phase delay.

Conclusion: Among real-world completers of an online sleep disorders screening questionnaire, there were reporting differences across groups. Hispanic/Latino individuals reported the highest number of sleep symptoms, though White and Black respondents also reported more symptoms than those who did not indicate being a member of those groups. Asian individuals reported the fewest sleep-related symptoms.

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1218

THE EFFECT OF A SLEEP- AND PHYSICAL ACTIVITY-RELATED TEXTING-BASED CONVERSATIONAL AGENT ON PERCEIVED COGNITIVE FUNCTION IN BREAST CANCER SURVIVORS

Chi-shan Tsai¹, Warren Szweczyk¹, Julia Palmer¹, Sophie Putnam¹, Hyo Chan Park¹, HyunHae Lee¹, Rachel Yung², Jason Liao¹, Alexi Vasbinder¹, Heather Greenlee², Michelle Drerup³, Jaimee Heffner², Kerry Reding¹

¹University of Washington, ²Fred Hutchinson Cancer Center,

³Cleveland Clinic Sleep Disorders Center

Introduction: Cancer-related cognitive impairment is a common symptom among breast cancer (BC) survivors that may be improved with sleep and physical activity. Cecebot, a 6-week texting-based conversational agent intervention, integrates cognitive behavioral therapy for insomnia and physical activity components. This study examines the effect of the Cecebot intervention on subjective cognitive function in BC survivors.

Methods: This 12-week crossover randomized controlled trial enrolled female BC survivors experiencing insomnia symptoms based on the Patient Reported Outcomes Measurement Information System Sleep Disturbance 8b scale (≥ 55 T-score). Data were collected at baseline, 6 and 12 weeks. The Insomnia Severity Index (ISI) was used to measure insomnia symptoms, and subjective cognitive function was assessed using the Perceived Cognitive Impairment subscale of the Functional Assessment of Cancer Therapy-Cognitive Function. The intervention group received Cecebot from Week 1–Week 6 and the control group from Week 6–Week 12. Linear mixed-effects models were used to analyze data.

Results: 60 participants (mean age 53.2 ± 11.1) with mild-to-moderate insomnia symptoms (mean Insomnia Severity

Index= 13.6 ± 4.35) were enrolled ($n=32$ intervention, $n=28$ control). There was no significant baseline between-group difference in cognitive function (intervention mean= 48.5 , control mean= 48.3 ; $p=0.96$). The intervention group showed a significant improvement in subjective cognitive function at Week 6 compared to baseline, with a mean increase of 6.47 points in cognitive function (95% confidence interval [CI]: 3.24, 9.69; $p < 0.01$), while the waitlist control group reported an decrease of 1.08 points. No significant between-group difference was observed ($p=0.12$). At Week 12, the improvements in the intervention group were sustained, and there was no between-group difference ($p=0.63$) due to a significant improvement in the waitlist control group from Week 6 to Week 12 ($+5.55$ points, 95% CI: 1.87, 9.22; $p < 0.01$).

Conclusion: This study suggests that a texting-based conversational agent sleep intervention may support improvements in subjective cognitive function in BC survivors, warranting a double-blind confirmatory study with a larger sample. Future studies may explore objective measures of cognitive function and investigate whether sleep or physical activity improvements mediate cognitive function improvements to better understand how Cecebot affects cognitive function.

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1219

THE EFFICACY OF INPATIENT SLEEP MEDICINE CONSULTS: DO PATIENTS FOLLOW UP AFTER DISCHARGE?

Tamara Jordan, Rehab Talat, Omar Srou, Miriam Jaziri, Luisa Bazan
Henry Ford Hospital

Introduction: Obstructive sleep apnea (OSA) and obesity hypoventilation syndrome (OHS) are associated with significant morbidity and mortality, especially among critically ill patients. The American Academy of Sleep Medicine (AASM) recommends inpatient diagnosis and treatment of OSA and close follow-up. The aim of this study is to identify potential barriers preventing follow-up after discharge.

Methods: This study is part of a larger project to evaluate the efficacy of inpatient sleep medicine consults at a large urban tertiary health center. This is a retrospective review of encounters for hospitalized adults from January 2015 to September 2025, and for which sleep medicine was consulted. Paired t-tests and chi square tests were calculated.

Results: Of 703 consults, 50% ($n=353$) had follow-up scheduled and 57% ($n=202$) of those showed up for the appointment. Of those who followed up, 59% ($n=120$) had subsequent visits. There was an average of 214 days between discharge and follow up. Those discharged with PAP were more likely to show up for their follow up appointment compared to those who were not discharged with PAP ($p < 0.001$). There was no significant difference in demographics, insurance, BMI, length of stay, disposition, or AHI between those who followed up and those who did not follow up.

Conclusion: Patients discharged with PAP are more likely to follow up after discharge, highlighting an important link in the transition of care. Our results revealed a prolonged duration of time between discharge and follow-up, which is likely multifactorial. These results serve as lessons learned for our program and other programs wishing to improve their consult services.

Support (if any):

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1220

UTILIZATION OF SLEEP STUDIES FOR INPATIENT SLEEP MEDICINE CONSULTSRehab Talat, Tamara Jordan, Omar Srour, Luisa Bazan, Miriam Jaziri
Henry Ford Hospital

Introduction: Obstructive sleep apnea (OSA), a form of sleep disordered breathing (SDB), is defined as a decrease or cessation of airflow while sleeping and affects a significant amount of the US population. Sleep apnea is associated with multiple medical comorbidities and timely intervention can lead to a prominent impact in patients' health. There is currently a dearth of data on the diagnosis of OSA and other sleep disorders in the inpatient setting. In this study, we looked at the use of sleep medicine inpatient consulting service to identify OSA and other sleep disorders.

Methods: This study is a retrospective chart review of 705 patients admitted to Henry Ford Hospital from January 2015 to September 2025. We looked at the reason for inpatient sleep consults, and what fraction of those led to a diagnosis of OSA. Descriptive statistics were calculated.

Results: Our data showed a high volume of inpatient sleep medicine consults. Sleep medicine was consulted for evaluation of obstructive sleep apnea, obesity hypoventilation syndrome, central sleep apnea, evaluation of positive pressure device settings, and insomnia. Of the 705 consults seen, 46% (n=301) of the patients had diagnostic sleep studies performed during their admission. While the vast majority were portable sleep studies, a small minority of patients had in-lab polysomnography done. Of the 301 patients who had inpatient sleep studies done, 97% (n=294) were diagnosed with OSA.

Conclusion: In our study, nearly all patients who had inpatient sleep studies performed were diagnosed with OSA. Our study shows that inpatient sleep medicine evaluation can help diagnose patients with OSA. This can lead to a timely diagnosis and treatment for at-risk populations.

Support (if any):

Abstract citation ID: zsag091.1220

1221

WHITE NOISE IMPLEMENTATION TO IMPROVE SLEEP IN INPATIENT ACUTE REHABILITATION UNITCaitlin Yumori¹, Michelle Zeidler², Kryss Earles³, Noel Enright⁴,
Kim Vu⁴, Dale Jun¹¹UCLA, ²Department of Medicine, David Geffen School of Medicine, University of California Los Angeles, ³Asheville VA, ⁴West Los Angeles Veteran's Administration

Introduction: Hospitalized patients have lower sleep quality, lower total sleep time, high wake after sleep onset, frequent nocturnal awakenings and do not achieve the recommended duration of sleep. White noise is a constant, ambient sound that can improve sleep quality and reduce sleep fragmentation. We aim to determine whether administration of white noise can improve patient sleep in an inpatient acute rehabilitation unit.

Methods: Patients were offered white noise machines in an acute rehabilitation unit at a Veteran's Administration hospital. Patient questionnaires evaluated subjective perception of sleep quality. Nursing staff documented hourly logs where they visually evaluated whether patients appeared to be asleep. In the morning,

physical medicine physicians documented patients' rest quality and sleep medications received.

Results: 34 patients (32 males, 2 females) were evaluated with 160 patient-nights of reported data. 22 white noise machines were distributed. 47% of participants held a prior sleep diagnosis. 67% of patients who used white noise found it to be helpful. Patient perceived hours of sleep aligned with nurse observation logs overall with a trend towards all patients overestimating their sleep (5.9 hours vs. 6.63 hours, p-value 0.06). 81% of white noise users were satisfied with their sleep compared to 65% of the non-white noise group (p-value 0.17). There were no differences in nocturnal awakenings or daytime energy level between the groups. Finally, there were no statistical differences in the administration of PRN sleep medications (32% vs. 22%, p-value 0.28).

Conclusion: This quality improvement project found that white noise usage was feasible and well-received by patients. Overall, patients found the white noise to be helpful and there was a trend towards improved sleep satisfaction and reduced sleep medication use among white noise users but no statistically significant differences in perceived hours of sleep, nocturnal awakenings, or provider perceptions of energy level the following morning between users and non-users in this small study. Larger studies of white noise with quantitative measures of sleep can evaluate if this accessible treatment can improve inpatient sleep and reduce the use of sedative hypnotics.

Support (if any):

Abstract citation ID: zsag091.1221

1222

WHO PRESCRIBES CANNABIS FOR SLEEP? A CROSS-SECTIONAL STUDY OF PRESCRIBER'S TRAINING, KNOWLEDGE, AND BELIEFSKritheeka Kalathil¹, Leah Ranney², Lauren Nicole Gorstein²,
Katherine Sharkey³, Jamila Battle⁴¹Atrium Health Carolinas Medical Center, ²Department of Family Medicine, University of North Carolina at Chapel Hill,³Wake-Forest University School of Medicine, Atrium Health, Advocate Health, ⁴University of North Carolina at Chapel Hill

Introduction: There is limited knowledge about what guides prescribing practices for cannabis due to the lack of formal clinical guidelines. This study describes physicians who recommend medical cannabis specifically for sleep issues, offering insight into factors that may influence real-world practice.

Methods: We recruited a national sample of cannabis prescribers via the Society of Cannabis Clinicians (SCC) website. Prescribers were emailed about the study, including a Qualtrics survey link, with up to 3 reminders between April-May 2024. Participants received a \$10 Amazon gift card for completing the survey. The survey assessed formal education, information sources, self-rated knowledge, and beliefs about cannabis and sleep, scored on Likert scales from 1 (strongly disagree/not knowledgeable) to 5 (strongly agree/extremely knowledgeable). Descriptive statistics were analyzed using SAS 9.4.

Results: Our sample (n=18) included 8 men and 10 women, and 83.3% identified as white; all were over 35 years old and 50% were over 65. Prescribers represented a range of specialties, most commonly Family Medicine, Emergency Medicine, and Internal Medicine, and were from 11 states with 50% practicing in the Southern US. None reported formal cannabis training during medical school or residency. Instead, most utilize online CME (94.4%), conferences (88.8%) or the SCC website (83.3%) for education.

Respondents rated themselves highly knowledgeable of the endocannabinoid system (Mean $\pm$ Standard Deviation (M $\pm$ SD) 3.9 $\pm$ 0.8) and cannabinoid properties (M $\pm$ SD 4.0 $\pm$ 0.8) but reported lower familiarity with sleep-wake disorders (M $\pm$ SD 3.0 $\pm$ 0.7). Although none was a Sleep Medicine specialist, participants reported high confidence in recommending cannabis for sleep (M $\pm$ SD 4.6 $\pm$ 0.6). Participants strongly agreed cannabis is effective for improving sleep quality (M $\pm$ SD 4.4 $\pm$ 0.5) and duration (M $\pm$ SD 4.2 $\pm$ 0.6), and for reducing sleep latency (M $\pm$ SD 4.1 $\pm$ 1.2).

Conclusion: These findings suggest that cannabis prescribers come from varied medical specialties, have minimal formal clinical training in cannabis or sleep medicine, rely on various sources for education, and have positive beliefs about the effectiveness of cannabis for sleep. Further characterization of cannabis prescribers will highlight opportunities for sleep medicine specialists to help shape formal prescriber education and promote evidence-based care for sleep disorders.

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1223

PRIMARY CARE VERSUS SLEEP MEDICINE MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA: A PATHWAY-BASED ANALYSIS OF TREATMENT ADHERENCE AND PERSONALIZATION

Kenna Morgan¹, Kannan Ramar², Timothy Morgenthaler²

¹Yale University, ²Mayo Clinic Rochester

Introduction: Obstructive sleep apnea (OSA) is common but often underdiagnosed and undertreated. Expanding the role of primary care providers (PCPs) may improve timely diagnosis and treatment of OSA, but patients report higher positive airway pressure (PAP) therapy adherence when cared for by specialists at centers accredited by the American Academy of Sleep Medicine. At Mayo Clinic, PCPs are now authorized to order home sleep apnea testing (HSAT) and subsequent therapy; HSAT is reviewed and interpreted by Sleep Medicine specialists (SMSs), but patients receive diagnoses and treatment recommendations through their PCP. This retrospective study evaluates whether patients diagnosed with OSA through primary and specialty care pathways experience comparable timeliness of care, counseling about therapeutic options, and PAP adherence.

Methods: Fifty-five patients were selected from each of two groups, based on whether their HSAT was ordered and initially managed by a PCP or SMS. Initial sleep metrics, PAP therapy adherence data, and other management details (treatments offered and key dates in the care pathway) were compared across groups.

Results: Once HSAT had been ordered, provider type was not associated with meaningful discrepancies in diagnosis and treatment timeliness; PCP-managed patients waited just one additional day after the interpretation of their HSAT to be offered treatment ($p=0.025$). However, consultation with Sleep Medicine introduced upfront delays caused by limited access to specialty care. The total time in the OSA care pathway, between referral to a SMS or pre-HSAT evaluation to the offering of treatment was 113 days for SMS patients versus 28 days for PCP patients ($p<0.001$). Additionally,

SMSs identified more co-occurring sleep disorders and discussed a broader range of treatment options with their patients, who demonstrated nightly PAP usage of 1.15 hours longer on average.

Conclusion: Despite differing modes of patient communication, PCPs offer timely OSA testing and diagnosis, allowing patients to bypass lengthy specialty care wait times. However, future efforts are needed to address variations in the counseling provided, and to ensure that all patients are equipped to succeed with PAP therapy. These findings support primary care pathways for uncomplicated OSA while highlighting the need for enhanced education and support to optimize patient outcomes.

Support (if any):

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1224

SCHEDULING PRACTICES, SLEEP, AND MEDICATION ADMINISTRATION ERRORS: PERSPECTIVES FROM STAFF NURSES AND NURSE LEADERS

Lynn Baniak¹, Nicole Beyer¹, Faith Luyster², Keri Rodriguez¹, Steven Shea³, Monique Boudreaux-Kelly¹, Patrick Strollo¹, Nicole Bowles⁴

¹VA Pittsburgh Healthcare System, ²University of Pittsburgh School of Nursing, ³Oregon Health & Science University, ⁴Oregon Institute of Occupational Health Sciences

Introduction: Long hours and rotating shifts often leave nurses insufficient sleep for cognitive recovery, increasing fatigue and medication administration errors (MAEs). Although sleep loss impairs attention and decision-making, its role in patient safety among nurses is understudied. This study explored, from the perspectives of bedside nurses and nurse leaders, how nurses' sleep, shaped by scheduling practices and home environments, interacts with workplace safety climate (perceptions of organizational commitment to safety) to impact MAEs.

Methods: Nineteen bedside nurses and 14 nurse leaders from inpatient units across two Veterans Health Administration hospitals were recruited. Semi-structured interviews with bedside nurses explored how work schedules influence their sleep and, reciprocally, how sleep impacts their work performance. Nurse leader interviews explored the need for nursing scheduling policies grounded in sleep science to reduce MAEs and challenges/supports for implementation. Matrix-based rapid qualitative analysis identified within- and across-group similarities and differences.

Results: Bedside nurses were on average 46.9 years old, White (90%), female (63%), held a bachelor's degree (58%), worked in acute care (47%), and had >10 years nursing experience. Nurse leaders were on average 52.4 years old, White (79%), female (93%), held a master's degree (71%), and had >10 years nursing leadership experience. Five key concepts emerged relating to (1) alignment of work schedules with recovery needs, (2) perceived effects of fatigue on performance and patient safety, (3) barriers to implementing sleep-informed scheduling policies, (4) perceptions of current scheduling policies, and (5) opportunities to improve

safety climate. Both groups recognized fatigue impairs performance and increases errors, consecutive/rotating shifts worsen fatigue, breaks are important but difficult to take, scheduling flexibility is valued, and adequate recovery time plus culture change to support sustainable and health-promoting scheduling practices are essential. Perspectives diverged on responsibility and feasibility for change; bedside nurses highlighted the need for scheduling flexibility and fairness, while nurse leaders emphasized organizational, contractual, and operational barriers that limit flexibility. Both groups identified distinct opportunities for improvement in promoting a culture of rest and recovery for nurses.

Conclusion: Evidence-based scheduling policies balancing autonomy with recovery time, supported by cultural change, are essential for nurse/patient safety and workforce well-being.

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1225

PREDICTORS OF POST-DISCHARGE SLEEP APNEA CARE ADHERENCE IN RURAL APPALACHIA

Adam Fetty¹, Maithily Patel², Cassandra Olgers³, Scott Knollinger¹, Vishal Deepak⁴, Edward Rojas¹, Robert Stansbury⁴, Sijin Wen¹, Sunil Sharma¹

¹West Virginia University, ²WVU Wheeling Hospital, ³WVU Medicine Ruby Memorial Hospital, ⁴West Virginia University Hospital

Introduction: Under-recognition of sleep apnea in hospitalized patients is well documented and contributes to adverse outcomes, including higher readmissions and mortality. Even when sleep apnea is detected during hospitalization, patients must complete post-discharge diagnostic testing and follow-up to achieve meaningful clinical benefit. In rural Appalachia, follow-up rates have historically been low. This study sought to identify factors associated with poor post-discharge completion of recommended sleep studies and clinic visits in this population.

Methods: As part of a formal clinical care pathway at a rural tertiary care center, patients admitted to medicine and heart failure services were screened for sleep apnea. Those screening positive received a comprehensive sleep medicine consultation, structured education, and recommendations for a post-discharge split-night polysomnogram and sleep clinic follow-up. Rural-Urban Commuting Area (RUCA) codes were assigned for each patient. Health literacy scores, demographics, and comorbidities were collected. Fisher's exact test and logistic regression were used to identify factors associated with poor post-discharge adherence.

Results: A total of 294 consecutive inpatients who screened positive for sleep apnea were followed for at least 90 days. The mean age was 61 years (range 20–86), and mean BMI was 37 kg/m² (range 17–87); 56% were male. Overall, 25% completed the recommended sleep study and 21% attended a sleep clinic visit after discharge. Higher health literacy (OR 3.59) and greater disease severity based on apnea-hypopnea index (AHI) (OR 1.016) were independently associated with higher rates of follow-up. In contrast, RUCA code—reflecting rurality—was not associated with post-discharge compliance.

Conclusion: In this rural Appalachian cohort, poor health literacy and milder sleep apnea severity were the key factors independently associated with lower post-discharge follow-up for diagnostic testing and clinic care, whereas rurality did not influence adherence. Interventions focused on improving patient education, enhancing health literacy, and prioritizing follow-up among patients with milder disease may help increase post-discharge compliance and optimize downstream outcomes.

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1226

SOCIAL VULNERABILITY INDEX AS A PREDICTOR OF SLEEP QUALITY IN ADULTS WITH OBSTRUCTIVE SLEEP APNEA

Ariana Gavanescu, Ahana Gupta, Abdelhamid Ghanem, Bharati Prasad

University of Illinois at Chicago

Introduction: Social determinants of health (SDoH) are associated with subjective and objective sleep quality in the general population. However, less is known about how SDoH affects sleep quality in obstructive sleep apnea (OSA). We hypothesized that the social vulnerability index (SVI), a comprehensive measure of SDoH and vulnerability based on geocoded data, would be significantly associated with sleep quality in adults with OSA. We examined the association between four SVI subscales and sleep quality.

Methods: Sixty adults with newly diagnosed OSA were recruited for this single-center study. Participants completed the Pittsburgh Sleep Quality Index (PSQI), questionnaire and underwent overnight polysomnography. Several manually scored and computationally derived EEG-based measures of sleep quality were used as objective indicators of sleep quality. These included manually scored sleep efficiency and arousal index (Ari), as well as the computed cumulative sleep index (CSI) and total arousal and awake index (TAraWI). The Centers for Disease Control SVI was used, which includes four subscales: socioeconomic status (SES), household characteristics (HC), racial & ethnic minority status (REMS), and housing type & transportation (HT). The association of each subscale with sleep parameters was examined. Multivariable linear regression models were adjusted for age, sex, body mass index, and apnea hypopnea index.

Results: The mean age of participants (N = 60) was 44.9 ± 9.4 years, and most participants were African American or Hispanic males. The mean SVI score was 0.76 ± 0.17, and the mean Apnea Hypopnea Index score was 69.4 ± 40.7. A higher REM subscale was associated with better subjective sleep quality (PSQI, t-statistic = -2.36, p = 0.02), but more objective sleep fragmentation (TAraWI, t-statistic = 2.12, p = 0.03). Higher HT was associated with higher Ari (t-statistic = 2.09, p = 0.04), and higher HC was associated with lower CSI (t-statistic = -2.04, p = 0.04).

Conclusion: Higher SDoH vulnerability with respect to racial & ethnic minority status, household characteristics, and housing type & transportation is associated with lower objective sleep quality in OSA, independent of age and OSA severity. These factors should be considered when designing and implementing interventions to improve sleep disturbances in OSA.

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1227

VALIDATION OF A WRIST-WORN DEEP LEARNING MODEL FOR SLEEP STAGING ACROSS THE SPECTRUM OF SLEEP APNEA SEVERITY

Sho Ogaki¹, Michiru Kaneda¹, Tomoyuki Nohara¹, Syuhei Fujita¹, Naoshi Osako¹, Tomoko Yagi², Yasuhiro Tomita³, Takanori Ogata¹¹ACCELStars, Inc., ²Kurume University, ³Toranomon Hospital

Introduction: Advancements in wearable devices have made it possible to easily and noninvasively acquire biological signals over extended periods. However, when using wearable devices to evaluate sleep in individuals with or without sleep disorders, it is necessary to examine how overall device performance varies with the type and severity of the disorder.

Methods: We developed a deep learning model that uses RR intervals and acceleration data measured by a wrist-worn device as input and examined its performance in sleep stage classification. Simultaneous measurements were conducted using polysomnography (PSG) and the wrist-worn device on healthy individuals and patients with sleep apnea (SA), and PSG assessments by specialists were used as the reference standard. The evaluation included two groups—healthy individuals (50 nights) and patients with SA (50 nights)—with accuracy and Cohen's kappa calculated for 5-stage classification, and the mean absolute error (MAE) for estimating total sleep time (TST). Furthermore, the SA group was divided into three subgroups based on AHI: (I) AHI < 30 (14 nights), (II) 30 ≤ AHI < 50 (21 nights), and (III) AHI ≥ 50 (15 nights), and each subgroup was evaluated separately.

Results: For the healthy group, the accuracy was 0.70, the kappa was 0.58, and the MAE was 14 min. For the SA group, the accuracy was 0.59, the kappa was 0.44, and the MAE was 26 min. Across the AHI-based subgroups, (I) showed 0.62/0.49/24 min, (II) 0.57/0.42/27 min, and (III) 0.60/0.42/29 min for the accuracy, kappa, and MAE, respectively.

Conclusion: Although performance in the SA group was slightly reduced compared with the healthy group, the MAE remained around 26 min (~10% of TST). In the AHI-based subgroups, (II) and (III) showed a modest reduction in accuracy and kappa compared with (I), while no marked difference was found between (II) and (III). The MAE for all subgroups stayed within 24–29 min, indicating limited influence of AHI. These findings suggest that even for patients with SA, regardless of severity (including very severe cases with AHI ≥ 50), this method has practical potential as a convenient approach for sleep evaluations.

Support (if any):

Abstract citation ID: zstag091.1227

1228

CLINIC TO COUCH: A QUALITY IMPROVEMENT PROJECT ANALYZING THE EFFECT OF ARTIFICIAL INTELLIGENCE SCRIBES ON DOCUMENTATION BURDEN IN OUR SLEEP CENTER

Joscilin Mathew¹, Noordeep Panesar¹, David Eapen¹, Dina Ali¹, Brian Chen², Vaishal Shah²¹Cleveland Clinic Foundation, ²Cleveland Clinic Sleep Disorders Center

Introduction: Artificial intelligence (AI) tools are increasingly used in clinical practice to reduce documentation burden and

improve workflow efficiency. This quality improvement (QI) project evaluated the impact of Ambience, an ambient AI scribe, on documentation-related metrics and adoption patterns among sleep clinicians over a short observational period.

Methods: Only providers who completed training and actively used Ambience were included. Data was analyzed for 27 providers in the Cleveland Clinic Sleep Disorders Center who utilized Ambience. Provider-level adoption data (training status, Ambience encounters, first/last use dates) were obtained from institutional records. Documentation metrics included documentation as a percent of clinic time and documentation time outside scheduled hours, were extracted from Ambience for 4 users who used Ambience for more than 180 days. Data was collected for four months pre-implementation (December 2024–March 2025) and two months post-implementation (May–June 2025), excluding April as a transition month.

Results: Review of data showed individual Ambience encounter volumes ranged from 236 to 1,325, with active use spanning 15–231 days. Among 27 providers reviewed, 30-day utilization of Ambience was 77.78 % (21/27) and 90-day utilization was 70.37 % (19/27). Review of documentation metrics for 4 providers with more 180-day usage showed a decrease in the Documentation as percent of clinic time, with a decrease in mean aggregate from 31.5 % (pre-Ambience) to 23.09 % (post-Ambience). While the aggregate mean of documentation time outside scheduled hours increased from a mean aggregate of 4.07 % (pre-Ambience) to 4.9 % (post-Ambience).

Conclusion: The successful adoption and active usage of Ambience indicate the tool's ease of implementation. Usage variability at 30 and 90 days highlights the need for continued interaction and workflow adjustments to improve transition. While reduced in-clinic documentation suggests improved workflow efficiency and higher patient interaction, increased after-hours work warrants investigation into contributing variables, such as the time required for reviewing and editing AI-generated notes. Larger follow-up studies are required to confirm these findings. Overall, AI scribes show promise for boosting documentation efficiency and patient-centered care.

Support (if any):

Abstract citation ID: zstag091.1228

1229

INTERVENTIONS TO REDUCE LOSS OF HSAT (HOME SLEEP APNEA TESTING) DEVICES AND ASSOCIATED COSTS: A CONTINUOUS IMPROVEMENT INITIATIVE

Sharan Jhaveri¹, Chelsi John², Holta Sulaj², Beata Earl², Preya Rana², Vaishal Shah³¹Cleveland Clinic, ²Cleveland Clinic Health System, ³Cleveland Clinic Sleep Disorders Center

Introduction: Home Sleep Apnea Testing (HSAT) programs rely on high-cost diagnostic devices that are vulnerable to loss, leading to substantial replacement costs and operational inefficiencies. Although health systems are already optimizing HSAT logistics, these interventions are largely structural (delivery, prioritization and insurance processing) and rarely focus on inventory management and the financial burden on non-return. HSAT is treated as a modality with a per-test cost, not as a loaned device with a measurable loss-rate and has not yet been modelled as its own economic problem. We implemented a series of workflow

and logistics interventions to reduce HSAT device loss, evaluate associated cost savings and improve device cycle time.

Methods: At the Cleveland Clinic's Sleep Disorder Center, we conducted a continuous-improvement initiative targeting HSAT device retention from January 2025 through September 2025. Sequential interventions included: (1) Billing list workflow with daily patient reminder phone calls for outstanding devices, (2) an apartment delivery workflow requiring signatures upon receipt, (3) 2week billing policy to prompt timely returns, (4) Real-time device location tracking using Air-Tags, and (5) Courier route optimization to improve pick-up/drop-off. We compared average monthly billed-unreturned devices and estimated cost savings before and after implementation of the bundled interventions.

Results: Devices billed as unreturned decreased from 46 in 2023 (3.8/month) and 39 in 2024 (3.3/month) to 10 between January and September 2025 (1.1/month). 20 devices were "saved," corresponding to approximately \$65,000 in avoided YTD replacement costs (devices valued \$3,250 each). As a direct result of these interventions, the average device use-rate increased from 1.6 to 3.3 uses per device per week effectively doubling our capacity to conduct HSATs thus improving access.

Conclusion: The literature is rich with HSAT implementation-oriented projects that focus on workflows and improving accessibility to care, but device return is always assumed rather than measured. To our knowledge, this was the first explicit attempt to quantify and optimize HSAT device inventory. A multipronged, implementation-focused HSAT workflow was associated with a substantial reduction in billed-unreturned HSAT devices and associated cost savings. These findings suggest that relatively low-cost operational interventions can significantly improve device retention in HSAT programs and may be generalizable to other home-based diagnostic modalities.

Support (if any):

Abstract citation ID: zsa091.1229

1230

SOCIAL DETERMINANTS OF ACCEPTABILITY OF DIGITAL THERAPEUTICS FOR INSOMNIA AMONG HISPANIC ADULTS: PATIENT AND PROVIDER PERSPECTIVES

Serena Habib¹, Meredith Diamond², Ian Kronish², Joseph Schwartz², Nathalie Moise³, Carmela Alcantara¹

¹Columbia University School of Social Work, ²Columbia University Irving Medical Center, ³Department of Medicine, Columbia University Irving Medical School

Introduction: Self-guided digital health treatments represent an innovative means of addressing the increasing prevalence of insomnia among Hispanics. This study assessed how social determinants of health influence patient and provider perceptions of the acceptability of a digital cognitive behavioral therapy for insomnia (dCBTi) intervention adapted for Spanish-speaking populations.

Methods: This was a secondary analysis of a hybrid type 1 effectiveness-implementation study on barriers and facilitators to dCBTi implementation. Individual semi-structured interviews

were conducted with 5 Spanish-speaking Hispanic patients with chronic insomnia and 9 healthcare providers from a large urban hospital system. Qualitative data were analyzed using thematic analysis and categorized using the National Institute on Minority Health and Health Disparities (NIMHD) interpretive framework.

Results: Patients were 49.8 years of age ($\pm$ 12.3 years) on average and 100% female. Providers were 50.6 years old ($\pm$ 9.2 years) on average, 22% male, and 78% female. Across domains of influence in the NIMHD framework, 20 themes were identified, 80% of which fell within the sociocultural environment domain. Patients more often described sociocultural factors at the community and society levels, emphasizing the impacts of mental health stigma and the influence of gender-role expectations shaped by *marianismo* (traditional feminine gender roles) on sleep. Patients also highlighted neighborhood noise, the broader public health burden of insomnia in the Hispanic community, and the limited knowledge of available mental health treatments. Providers primarily identified social determinants at the individual level, noting the influence of immigration status, language, educational attainment, and digital literacy on perceived patient suitability for digital therapeutics. Providers also described individual-level factors like lack of smartphone access, limited time, and housing instability as barriers to patient acceptability.

Conclusion: Factors related to the sociocultural environment shaped patient and provider perceptions of the acceptability for dCBTi for Hispanic populations. Successful implementation of dCBTi in the Hispanic community requires a more nuanced approach that accounts for the multiple levels and domains of social determinants shaping acceptability, particularly in relation to the sociocultural environment.

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1231

IMPLEMENTATION DETERMINANTS OF UPTAKE OF A DIGITAL THERAPEUTIC FOR INSOMNIA FOR HISPANICS: A QUALITATIVE ANALYSIS OF KEY STAKEHOLDER PERSPECTIVES

Carmela Alcantara¹, Serena Habib¹, Meredith Diamond², Ian Kronish³, Joseph Schwartz², Nathalie Moise²

¹Columbia University School of Social Work, ²Columbia University Irving Medical Center, ³Columbia University Irving Medical School

Introduction: Cognitive behavioral therapy for insomnia (CBT-I) is the first-line treatment for chronic insomnia, yet few receive this standard of care, and those from marginalized groups suffer a disproportionate impact. While digital CBT-I (dCBTi) shows promise in addressing access disparities, the specific barriers and facilitators for the successful implementation of digital therapeutics for those with limited English proficiency is unknown. Our aim was to identify the implementation determinants of dCBTi, overall, and for Hispanic adults.

Methods: We conducted 25 semi-structured virtual interviews with 5 Spanish-speaking Hispanic patients with chronic insomnia, 9 healthcare providers from a large urban hospital, and 11 content experts/leaders (local/national hospital administrators, community and business leaders, sleep advocates, health navigators, clinical psychologists, and representatives from digital therapeutics advocacy groups and government agencies). Interviews were audio-recorded and transcribed. Data were analyzed using thematic analysis and categorized using the Consolidated Framework for Implementation Research.

Results: Patients (Mage=49.8 [SD=12.3]) were middle-aged Hispanic women from Mexico, Cuba, or the Dominican Republic. Providers (Mage=50.6 [SD=9.2]), and content experts/leaders (Mage=47.7 [SD=4.8]) were majority women, non-Hispanic White, and >80% had worked with their organization for over 5 years. Over 90% of the themes identified pertained to perceived determinants of digital therapeutics uptake related to the innovation (source, evidence-base, relative advantage, adaptability, trialability, complexity, design), and individuals' domain (concerns about the capability, opportunity, need or motivation of digital therapeutic recipients or deliverers), which were raised by all stakeholder groups. Content experts and leaders were the only stakeholder group to identify themes focused on outer setting determinants (local attitudes, policies and laws, financing, external pressure). Patients and providers indicated that the inclusion of third-party support (i.e., additional social and navigation support) will be an essential implementation process strategy to engage digital therapeutic recipients. Content experts/leaders and providers also emphasized inner setting determinants such as integrating the digital therapeutics within their existing work-infrastructure (i.e., electronic health record).

Conclusion: Our analysis of stakeholders' perspectives suggests that increasing the uptake of dCBTi in underserved populations will require coordinated, multi-level implementation strategies that address multiple barriers at the policy, organizational, individual, and the digital therapeutic design level.

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Abstract citation ID: zsag091.1231

1232

AUTOMATING HSAT PATIENT DATA CAPTURE WITHIN EHR (ELECTRONIC HEALTH RECORDS SYSTEM) TO IMPROVE WORKFLOW EFFICIENCY AND REDUCE WASTE

Sharan Jhaveri¹, Chelsi John², Holta Sulaj², Hilaria Wilson², Parth Modi², Vaishal Shah³

¹Cleveland Clinic, ²Cleveland Clinic Health System, ³Cleveland Clinic Sleep Disorders Center

Introduction: Home Sleep Apnea Testing (HSAT) workflows often rely on paper-based patient questionnaires (PQs) and manual data entry, creating inefficiencies and risks for errors. Although health systems are optimizing HSAT logistics, these interventions are largely structural [delivery, prioritization and insurance processing] and rarely address data capture or report granular metrics. This clinical quality improvement project aims to assess the

significant efficiency gain and the reduced waste by automating HSAT patient data capture using an EHR-integrated workflow.

Methods: The pre-intervention process required patients to complete a 2-step process. Offline paper forms were manually scanned, uploaded, and entered or tagged in the EHR. Online financial attestation forms were filled via a 3rd party application. At the Cleveland Clinic's Sleep Disorder Center, we implemented an automated workflow using Power-Automate and the EHR patient portal, enabling coordinators to send standardized electronic templates for patients to enter data electronically. Manual scanning and re-entry were eliminated. Process measurable outcomes included coordinator time per patient, weekly savings in terms of time, cost and paper consumption.

Results: These interventions reduced coordinator time by 4 minutes per patient and at a volume of 290/week HSATs, saved 19.3 labor hours/week. The associated labor cost savings were \$427/week and \$22,217.87 annually. Integrating the financial attestation within MyChart amounted to \$51,000 in additional costs saved. The new workflow eliminated the use of 30,160 sheets of paper annually (approximately \$210 in material costs), with an estimated environmental benefit equivalent to preserving 1.5 trees per year. Standardized electronic templates improved data accuracy by reducing opportunities for transcription and scanning errors. Given that this intervention was integrated into EHR, there was virtually no adoption friction on the patient end.

Conclusion: The literature is rich with HSAT implementation-oriented projects that focus on workflows and improving accessibility to care, but rarely focus on the administrative burden. To our knowledge, this is the first explicit attempt on quantifying and optimizing the same. Automating HSAT patient data entry through a patient portal-based workflow substantially improved the process efficiency, financial performance, paper waste and drove data standardization. This approach is generalizable to other diagnostic workflows that currently depend on paper forms and manual data entry.

Support (if any):

Abstract citation ID: zsag091.1232

1233

BRIDGING THE GAP: INTEGRATING SLEEP HEALTH INTO CARDIOMETABOLIC CARE THROUGH CLINICAL ASSESSMENT AND KNOWLEDGE TRANSLATION

Nazli Parast¹, James Kim², Akshay Jain³, Jerome Alonso⁴

¹University of Ottawa Heart Institute/ University of Ottawa/ Calgary University, ²University of Calgary, ³TLC Diabetes and Endocrinology, ⁴The Canadian Sleep Consultants

Introduction: Insomnia—characterized by difficulty initiating or maintaining sleep or early morning awakenings—affects up to one-third of adults and is increasingly recognized as a modifiable risk factor for cardiometabolic diseases. A growing body of evidence links insomnia to type 2 diabetes, cardiovascular disease, chronic kidney disease, and metabolic dysfunction-associated steatotic liver disease. Mechanistically, insomnia contributes to

cardiometabolic risk through increased sympathetic nervous system activity, hypothalamic-pituitary-adrenal axis dysregulation, and elevated inflammatory markers. Despite its high prevalence and clinical impact, insomnia remains underdiagnosed and undertreated, particularly in patients with obesity and related metabolic conditions. This underscores the need to integrate sleep health into routine cardiometabolic care.

Methods: This multiphase study aimed to (1) evaluate the feasibility and clinical need for sleep assessments in a specialty endocrinology clinic serving patients with obesity and/or diabetes, and (2) translate findings into actionable knowledge for primary care providers. Phase One involved structured sleep assessments of 69 patients, focusing on sleep patterns, satisfaction, and the impact of sleep disturbances on daily functioning. Phase Two consisted of targeted knowledge translation activities, including educational sessions and dissemination of clinical tools to primary care providers, aimed at enhancing their capacity to assess and manage sleep health.

Results: Prior to the study, only 46% of participants reported that their sleep had ever been assessed by a primary care provider. While 9% were open to initiating pharmacologic treatment, 23% preferred discussing sleep concerns with their primary care provider. Notably, 70% of participants reported increased awareness of sleep's importance following assessment, and the majority expressed satisfaction with the sleep evaluation conducted in the specialty clinic. Post-training surveys from primary care providers indicated a marked increase in confidence and comfort in addressing sleep health with patients.

Conclusion: This study highlights a critical gap in sleep health assessment within cardiometabolic and obesity care settings. Routine integration of sleep evaluations in specialty clinics, coupled with targeted education for primary care providers, can enhance early identification and management of insomnia. Given the bidirectional relationship between sleep disturbances and obesity, prioritizing sleep health is essential for improving outcomes and reducing the burden of chronic disease.

Support (if any):

Abstract citation ID: **zsag091.1233**

1234

ECONOMIC BURDEN OF COMORBID INSOMNIA AND OBSTRUCTIVE SLEEP APNEA (COMISA) IN THE UNITED STATES MILITARY HEALTH SYSTEM

Emerson Wickwire¹, Vincent Capaldi², Benoit Stryckman¹, Jennifer Albrecht¹, Connie Thomas³, Wendy Funk⁴, Jeph Herrin⁵

¹University of Maryland School of Medicine, ²Uniformed Services University of the Health Sciences, ³Walter Reed Army Institute of Research, ⁴Kennell and Associates, Inc., ⁵Yale University

Introduction: Insomnia and obstructive sleep apnea (OSA) are highly prevalent among active-duty U.S. military personnel, and co-occurrence of the conditions is common. Compared to either condition alone in civilian populations, comorbid insomnia and OSA (COMISA) is associated with worse health outcomes, greater healthcare resource utilization, and higher healthcare costs. The purpose of this study was to determine the economic burden of

COMISA among active-duty military personnel. We hypothesized that relative to insomnia and OSA alone COMISA is associated with greater healthcare resource utilization and costs.

Methods: Data were derived from the Military Data Repository (MDR) from 2016-2021. Inclusion criteria were age < 65 years, active-duty military personnel, 12 months of continuous enrollment before and after insomnia or OSA diagnosis, and no evidence of prior insomnia or OSA. COMISA was defined as receipt of an insomnia diagnosis within 365 days of OSA diagnosis. Generalized linear models with log link were used to compare direct costs between individuals without sleep disorders, insomnia alone, OSA alone, or COMISA across multiple points of service: outpatient, inpatient, and emergency department (ED). Costs were adjusted for age, sex, military service, region, comorbidities and prior year costs.

Results: The final sample included n=183,961 active-duty military personnel without sleep disorders, n=40,278 with insomnia alone, n=27,103 with OSA alone, and n=3,956 with COMISA. Most participants were between ages 35-44 years (40.7%), and male (82.1%). Average adjusted outpatient costs were highest in the COMISA group (without sleep disorders: \$4,036; insomnia alone: \$9,940; OSA alone: \$6,910; COMISA: \$10,759; $p < 0.001$), as were average adjusted ED costs (without sleep disorders: \$214; insomnia alone: \$363; OSA alone: \$395; COMISA: \$500; $p < 0.001$), while average adjusted inpatient costs (without sleep disorders: \$168; insomnia alone: \$267; OSA alone: \$3; COMISA: \$169; $p < 0.001$) were highest in the insomnia group.

Conclusion: Relative to military personnel without sleep disorders, with insomnia alone, or with OSA alone, individuals with COMISA incur greater inpatient, outpatient, and ED costs. Future research should examine the effect of sleep disorders treatments on health and economic burden as well as military readiness in the U.S. military.

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1235

EFFECT OF REMOTE PATIENT MONITORING ON CPAP ADHERENCE AND PATIENT-REPORTED OUTCOMES IN OBSTRUCTIVE SLEEP APNEA: A COMPARATIVE STUDY

Ricardo De Armas¹, Edward Mezerhane², Aron Bobrowski³, Francesca Barnes⁴, William Hevener⁴, Bretton Lane⁴, Dominic Munafò⁴

¹Massachusetts General Hospital, ²Sleep Medicine Specialists of South Florida, ³MonitAir, ⁴BetterNight, LLC

Introduction: Obstructive sleep apnea affects nearly one billion adults worldwide and is associated with hypertension, diabetes, and cardiovascular disease when untreated. Continuous positive airway pressure (CPAP) therapy is the gold standard, but its efficacy is limited by poor adherence. Remote patient monitoring (RPM) has shown promise for improving CPAP adherence, but high-quality evidence remains limited.

Methods: We conducted a prospective, open-label, active-comparator, randomized trial evaluating an RPM program versus standard of care (SOC) for adults aged ≥ 18 years who were CPAP-naïve and owned a smartphone. Participants were randomized 1:1 to receive either SOC (CPAP therapy and structured coaching program) or RPM (web-based application monitored CPAP therapy and coaching). The primary endpoint was Medicare-defined CPAP adherence ($>70\%$ of nights with >4 hours of use within a consecutive 30-day period within the first 90 days). Secondary endpoints included adherence rates, mask-leak days, patient satisfaction (using a Likert scale), and sleep quality measures at 30, 60, and 90 days. Statistical significance was set at $p < 0.05$.

Results: In total, 1459 patients were approached, 330 met the inclusion criteria, 200 consented, and 196 patients (98 per group) had complete data collected. Participants were 65% male, median (interquartile range) age of 51(41-62) years, an apnea-hypopnea index of 22(14-38), and a body mass index of 32(29-37) kg/m². Medicare-defined CPAP adherence was not statistically higher in the RPM versus the SOC group (80.6% vs 73.5%, $p=0.308$). However, RPM demonstrated trends toward better adherence in 60 days (80% vs 73%, $p=0.086$) and 90 days (77% vs 67%, $p=0.140$). RPM achieved significantly fewer mask leak days at 90 days (11.2 vs 14.5 days, $p=0.009$) and significantly higher Likert-scale patient satisfaction scores on: 1) timely response for support ($p=0.042$); 2) met expectations for the coaching program ($p=0.033$); and 3) satisfactory issue resolution ($p=0.036$).

Conclusion: Although RPM did not significantly increase Medicare-defined CPAP adherence, there was a trend towards improvement across all primary and secondary endpoints. This study may have been underpowered to detect significant differences. The RPM cohort showed reduced mask leaks and improved patient-reported experience, suggesting that RPM enhanced specific aspects of CPAP therapy management.

Support (if any):

Abstract citation ID: zsag091.1235

1236

IMPACT OF PHARMACY SUPPORT ON TIRZEPATIDE MANAGEMENT IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA OR OBESITY

Amanda Gronniger, Elaina Rosario, Wendy Cardenas, Lisa Davis, Stephen Breazeale, Anshul Saxena, Harneet Walia
Baptist Health South Florida

Introduction: Zepbound® (tirzepatide) is a newly indicated treatment option for moderate to severe obstructive sleep apnea (OSA) and obesity. In our pharmacist-supported clinics, pharmacists assist with prior authorizations (PA) and medication titration, aiming to streamline access and optimize therapy. This study evaluated the impact of pharmacist-supported clinics compared to non-supported clinics on BMI reduction, PA completion, and titration patterns in patients prescribed tirzepatide.

Methods: A retrospective review included 94 adults (≥ 18 years) prescribed tirzepatide by cardiology or sleep medicine providers. A report was generated capturing all patients who had an active

tirzepatide prescription between May 1 and May 31, 2025, even if the medication had been prescribed earlier. Patients were categorized into two groups: pharmacist-supported clinics and non-supported clinics. The primary outcome was change in BMI from baseline to follow-up. Secondary outcomes included PA completion, denial rates, and adherence to recommended titration schedules. Paired t-test was utilized to compare differences in mean.

Results: Of 94 patients, 72 (77%) were managed in pharmacist-supported clinics and 22 (23%) in non-supported clinics; 72 (77%) were treated for OSA and 22 (23%) for weight management. Overall, mean BMI reduction was 2.07 kg/m² in the pharmacist-supported group ($p < 0.001$) versus 1.12 kg/m² in the non-supported group ($p > 0.14$). Among OSA patients, mean BMI reduction was 2.9 kg/m² in the pharmacist-supported group ($p > 0.12$) versus 0.6 kg/m² in the non-supported group ($p > 0.06$). PA completion occurred in 71 (99%) pharmacist-supported cases versus 14 (64%) in the other group. 33 (46%) prior authorizations were denied in the pharmacist-supported group and 13 (59%) were not completed or denied in the other group. 59 patients started tirzepatide (48 pharmacist-supported, 11 non-supported). Appropriate titration occurred in 47 (98%) pharmacist-supported patients compared to 4 (37%) in the non-supported group; 3 (27%) in the latter group were not titrated.

Conclusion: These preliminary findings suggest that pharmacist-supported clinics may improve BMI reduction, prior authorization completion, and adherence to titration schedules in patients prescribed tirzepatide for OSA and obesity. By managing medication access and optimization, pharmacists can help providers focus on clinical decision-making and work at the top of their license.

Support (if any):

Abstract citation ID: zsag091.1236

1237

RISK EVALUATION AND MITIGATION STRATEGIES: FROM BURDEN TO BENEFIT

Lindsay McCullough¹, Craig Chepke², Richard Bogan³, Martha Curtin⁴, Diana Anderson⁵, Jennifer Gudeman⁵, Marla Scarola⁵, Tracy Gentile⁶, Danielle Burroughs⁵

¹Department of Medicine, Rush University Medical Center, ²Excel Psychiatric Associates, ³University of South Carolina School of Medicine, ⁴Suburban Sleep, ⁵Avadel Pharmaceuticals, ⁶UBC

Introduction: Risk Evaluation and Mitigation Strategies (REMS) are safety programs required by FDA to ensure benefits outweigh risks of certain medications. Currently, 69 medications have REMS, including oxybates due to their boxed warning for CNS depression, abuse, and misuse. Oxybate REMS ensure safe and appropriate use, secure handling preventing diversion or unintended exposure, and provide infrastructure to document and communicate concerning behaviors. For unfamiliar patients and clinicians unfamiliar, oxybate REMS enrollment and requirements may be perceived as daunting, and possibly hinder oxybate use and restrict patient access to potentially transformative therapy.

Methods: Tasks for patient enrollment and provider and pharmacy enrollment/certification in LUMRYZ REMS and ongoing

activities ensuring safe use, appropriate prescribing, and mitigating abuse, misuse, and diversion of extended-release sodium oxybate (SXB) were described.

Results: To enroll and become certified in LUMRYZ REMS, prescribers and patients provide basic contact/professional licensure information on an online or single-page paper form. Online enrollment enables potential same-day, often within minutes, prescriber certification. The office-contact portal allows for online initiation of patient enrollment and management of tasks and communication. Prescribers/patients attest to completion of counseling/training, understanding risks, proper handling, safe use, and storage of SXB; keeping medications/medical history updated; following assessment/evaluation protocols; and prescriber reporting of serious adverse events and signs of abuse/misuse/diversion. Through 30 September 2025, 3507 prescribers were enrolled and certified and 7981 patients were enrolled (disenrolled: prescriber, $n=1$; patients, $n=5$). At certified pharmacies ($n=4$), pharmacists confirm eligibility per the REMS and all Elements To Assure Safe Use (ETASU) are met (eg, patient counseling checklist [includes drug-drug interaction and comorbidities check]; risk management for abuse/misuse/diversion; check for active/overlapping oxybate prescriptions). Before dispensing or shipping prescriptions, pharmacists verify and document ETASU within the REMS, contacting the patient or prescriber as needed. To further protect patients and prescribers, the sponsor actively oversees the REMS to identify and address noncompliance; conduct REMS Knowledge Assessments of enrolled entities; and submit annual REMS data reports to FDA.

Conclusion: Understanding REMS requirements for oxybates, recognizing the responsibilities of communicating with REMS-certified pharmacists, and educating patients about the REMS are essential to reducing barriers to access and ensuring safe, compliant oxybate use.

Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zstag091.1237

1238

SYSTEMATIC SCREENING AND IDENTIFICATION OF OBSTRUCTIVE SLEEP APNEA IN HOSPITALIZED PATIENTS

Liliya Polyak, Joe Matias, Geraldine Vargas, Adrian Pristas, Matthew Scharf
Hackensack Meridian Health

Introduction: Undiagnosed obstructive sleep apnea (OSA) in hospitalized patients is a significant contributor to adverse outcomes, including hospital readmissions. To address this, a systematic inpatient sleep screening program was implemented across the Hackensack Meridian Health system in October 2021. The program utilized an Electronic Medical Record (EMR)-integrated screening tool to identify patients meeting high-risk criteria. Patients identified by the tool, or referred directly by their primary medical team, underwent an evaluation by a specialized sleep Advanced Practice Nurse (APN) who determined the need for further diagnostic testing. This study aimed to evaluate the feasibility and outcomes of this large-scale program.

Methods: The program was implemented at five hospital sites. Registered Polysomnographic Technologists (RPSGTs) identified high-risk inpatients. These patients then underwent an evaluation by a specialized sleep Advanced Practice Nurse (APN), who determined the need for further outpatient diagnostic testing. Diagnostic options included either a home sleep apnea test (HST) or in-lab polysomnography (PSG). All patients who completed a sleep study were subsequently contacted to schedule an outpatient follow-up for treatment and management.

Results: Widespread adoption of the program was achieved at each site. Key to the success was engagement of the inpatient sleep team with the inpatient teams at each site. Program success was driven by acceptance from patients and inpatient medical teams, emphasizing a clear clinical need. Thorough patient education and consistent engagement between inpatient sleep teams and hospital providers was essential.

Conclusion: We demonstrated the successful implementation and feasibility of a large-scale, multi-site inpatient OSA screening program. This model can effectively address the substantial underdiagnosis of OSA in high-risk hospitalized populations, likely improving patient outcomes. Systematic assessment of this program is warranted including the characteristics of patients recommended for sleep studies (including diagnostic yield), and readmission rates among patients who completed the program.

Support (if any):

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1239

AN ESTIMATE OF SOLID WASTE PRODUCED BY CPAP TREATMENT IN THE UNITED STATES

Laura Donahue¹, Timothy Morgenthaler²

¹Vanderbilt University Medical Center, ²Mayo Clinic, Rochester

Introduction: Obstructive sleep apnea is an increasingly common condition seen in sleep medicine with prevalence estimates of up to 1 billion patients globally. Treatment with CPAP machines is the mainstay of therapy for patients with moderate-severe OSA, but is resource intensive due to the need for complex electronic equipment and frequent supply refills. The United States healthcare system is estimated to produce 9 million tons of solid waste annually; however, it has not been determined how sleep medicine clinical practices contribute to this total. The purpose of this study was to estimate the total solid waste produced by the treatment of moderate-severe OSA with CPAP in the U.S. over a 10 year period.

Methods: We modeled waste generation under a steady-state CPAP-treated population (4.8 or 24 million patients), assuming an annual 15% exit/entry rate. Each new patient was assigned a CPAP machine at initiation; existing users contributed waste from ongoing consumable use. Waste calculations included machine and accessory weight (masks, tubing, filters). We evaluated scenarios by varying mask type distribution, tubing type (heated; non-heated), and machine/supply replacement schedules to create total waste estimates.

Results: The solid waste associated with treating 4.8 million U.S. patients with moderate-severe OSA over ten years ranged from

88.7 to 104.4 kilotons. Maximum waste occurred with heated tubing use, CMS replacement schedules, 5-year device replacement, regardless of mask mix (104.4-104.5 kilotons). Waste was reduced by 15% using lightweight tubing and extending device life to 7 years, and by 45% using a reduced replacement schedule modeled on French practice (2-4 masks/year, 1 tubing/filter/year, 1 water reservoir/year).

Conclusion: Treatment with CPAP is a resource intensive therapy that produces a significant amount of plastic and electronic waste annually, likely contributing to ongoing environmental and climate degradation. Extending CPAP machine and supply lifespan and selecting for lighter PAP supplies, such as non-heated tubing, can significantly reduce the waste associated with U.S. CPAP use.

Support (if any):

Abstract citation ID: zsag091.1239

1240

UNITING THE SLEEP APNEA CARE TEAM: AN INTEGRATED OPERATING SYSTEM THAT INCREASES TESTING COMPLETION AND SHORTEN TIME TO THERAPY

Lea Desmarteau

SleepNavigator Inc.

Introduction: Care for patients evaluated for sleep apnea is commonly fragmented across referring clinicians, sleep laboratories, therapy providers, and payers, limiting visibility and delaying treatment. A cloud-based operating system for sleep medicine was implemented to place all participants in the patient pathway on a single platform with role-based workflows and status transparency from referral through diagnostic testing and treatment initiation. We evaluated its impact on reliability, throughput, and time to therapy.

Methods: We conducted a multi-site quality-improvement analysis of de-identified operational metrics from three sleep management programs using the system. The cohort included adults and pediatric patients referred between January 2024 and August 31, 2025 (n = 16 028) from approximately 500 community, academic, and specialty practices. The platform supported referral intake, test scheduling, study completion, interpretation, therapy ordering, and early follow-up. Measures included order validity, scheduling and completion rates, staff time per order, estimated cost per order, and time from order receipt to scheduled test and from diagnostic completion to therapy order. Results were summarized descriptively and compared with United States benchmarks ($\approx$ 50% valid orders, 55% scheduled, 65% completed, $\approx$ 180 days from test to treatment).

Results: Programs using the integrated system processed a mean of 1 200 diagnostic orders per month. Valid-order rate was 100% versus the 50% benchmark; 87% of valid orders were scheduled and 93% of scheduled studies were completed, exceeding estimates of 55% and 65%. Overall study completion was 85%. The mean interval from diagnostic completion to therapy order was 43 days, shorter than the $\approx$ 180-day benchmark. Staff time per order decreased 36%, with an estimated \$40 saving per order.

Conclusion: A single cloud-based operating system for all stakeholders created visibility into the sleep apnea pathway, enabled more patients to move from referral to completed testing and therapy orders, and increased throughput without additional staff. By improving reliability, access to diagnostic evaluation, and time to treatment, integrated workflows may help reverse patterns in which individuals with suspected sleep apnea do not complete testing or therapy.

Support (if any): Operational data were provided by the sponsoring company and affiliated sleep-management practices. No external funding.

Abstract citation ID: zsag091.1240

1241

PATIENT LEADERSHIP IN SLEEP RESEARCH: A MODEL FOR TRAINING PATIENTS AS INVESTIGATORS ON RESEARCH TEAMSErin Taylor¹, Gilles Frydman¹, Sarah Honaker²¹Wellness, Sleep and Circadian Network, ²Indiana University School of Medicine

Introduction: Sleep apnea research has traditionally prioritized biometric indicators over patient-centered outcomes, often overlooking the quality-of-life improvements most valued by patients. Integrating patient investigators into research teams offers a pathway to ensure that study outcomes reflect patient priorities. In 2022, the Wellness, Sleep and Circadian Network (WSCN), formerly the American Sleep Apnea Association, received funding from the Patient-Centered Outcomes Research Institute to design and deliver a training program that equips sleep apnea patients with the skills needed to serve as patient investigators.

Methods: WSCN convened a Patient Leadership in Research (PLIR) committee composed of 12 sleep apnea patients representing diverse backgrounds. The PLIR committee reviewed existing publicly available educational resources and subsequently developed a 12-session curriculum – Patient Researchers Influencing Sleep Medicine (PRISM) – to prepare patients for active participation on research teams. The PRISM curriculum addresses sleep science, sleep apnea diagnostics and therapeutics, the structure and ethics of research, research validity, patient-centered and comparative-effectiveness research principles, and expectations for patient investigators. The program was delivered twice in 2024 and iteratively refined based on comprehensive participant feedback.

Results: The PRISM initiative trained 25 patient investigators, including the 12 PLIR committee members and 13 additional training participants. Training participants (not PLIR members) evaluated the sessions on a scale of 1 – 5, where 1 = “poor” and 5 = “excellent.” Participants rated each session on being “informative,” “engaging,” and “useful to you,” and responses were averaged. Of the 16 training sessions that were measured, 14 (88%) scored 4.0 or above (both introductory sessions scored 3.78). Additionally, 11 of the 13 PRISM participants completed post-training assessments. Among these respondents, nine (78%) reported feeling “very confident,” one (9%) “somewhat confident” and one (9%) “unsure” in their ability to contribute as patient investigators.

Conclusion: The PRISM pilot validates the feasibility of a standardized curriculum to bridge the methodological literacy gap between patients and investigators. High participant confidence suggests the model successfully democratizes research concepts for laypeople. While the training phase is complete, the program's ultimate value will be measured by the successful integration of these cohorts into active trials which will be a primary focus of WSCN.

Support (if any):

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1242

COZY CRITTERS AT BEDTIME: PARENT-REPORTED IMPACT OF A STORYTELLING PODCAST ON CHILD SLEEP AND CAREGIVER RESTLiz Lezama¹, Sujith Modugula¹, Kathy Chan¹, Doug Fraser², Anna Wani³, Humza Siddiqi¹¹The University of Texas Southwestern, ²N/A, ³Children's Health

Introduction: Bedtime routines are essential for pediatric sleep health, supporting sleep onset and reducing nighttime awakenings. Calming audio-based interventions have demonstrated benefits for subjective sleep quality and bedtime cooperation. Unlike screen-based media, podcasts are non-visual and therefore minimize cognitive arousal while maintaining engagement. This makes podcasts a novel, low-cost, and scalable tool for reinforcing healthy sleep hygiene; however, data evaluating their use in pediatric sleep routines remain limited.

Methods: In collaboration with the creator of the Cozy Critters podcast, the authors developed a brief, cross-sectional, parent-reported online survey distributed to podcast subscribers. Child demographics, podcast listening frequency, context of use, and perceived changes in sleep outcomes were assessed including sleep onset latency, nighttime awakenings, and morning alertness. Caregivers also reported their own sleep duration and perceived sleep quality on nights when the podcast was used. Open-ended responses captured qualitative feedback regarding user experience. Descriptive statistics were used to summarize categorical and continuous variables, and frequency counts were generated for multi-select response.

Results: A total of 112 responses were included. Most children were 5–7 years of age and listened to the podcast 5–7 nights per week, most often after lights-out using smart speakers or Yoto devices. The most commonly reported perceived benefit was faster sleep onset, followed by fewer nighttime awakenings and improved morning alertness. Overall helpfulness ratings were high, with most respondents rating the podcast as “very” or “extremely” helpful. Caregivers reported sleeping approximately 7–8 hours per night with generally good sleep quality on nights the podcast was used. Qualitative responses emphasized the calming narrator voice, predictable structure, and educational animal-themed content. Parents highlighted that the podcast was easy to integrate into bedtime routines, reduced bedtime-related stress, and functioned as a reliable tool to reinforce healthy sleep behaviors.

Conclusion: Parents perceive podcast-based storytelling as a helpful adjunct to bedtime routines, associated with improved child sleep onset and continuity, and better caregiver rest. This screen-free intervention aligns with evidence supporting structured bedtime routines and calming auditory input and may represent an accessible resource for promoting pediatric sleep hygiene. Future studies should include objective sleep measures and evaluate its role alongside established behavioral sleep interventions.

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1243

A MULTIDISCIPLINARY EXPLORATION FOR THE EVALUATION AND MANAGEMENT OF INSOMNIADavid Eapen¹, Michelle Drerup², Noordeep Panesar¹, Joscelin Mathew¹, Dina Ali¹, David Creel¹, Allyson Wright¹, Alicia Roth³, Alaina Tiani¹, Michael Saribalas¹¹Cleveland Clinic Foundation, ²Cleveland Clinic Sleep Disorders Center, ³Cleveland Clinic

Introduction: There has been a concentrated effort to improve care quality through the formation of interdisciplinary teams to address multifaceted health issues. One such issue, insomnia, has

far-reaching implications if not addressed in all its facets. In order to address this concern and prepare clinicians for care coordination, an interdisciplinary educational experience for medical students and health psychology externs has been developed.

Methods: A four week interdisciplinary hybrid classroom experience has been developed in conjunction with the behavioral sleep medicine and obesity center departments. Third and fourth year medical students are paired with a health psychology graduate extern for both direct patient contact as well as a didactic experiences. The trainees receive lectures from a multidisciplinary staff team around the diagnosis, management, and treatment of insomnia; sleep pharmacotherapy; the impact of substance use on sleep; the effect of meal timing and composition; and optimization of physical activity and timing. Learners apply cognitive behavioral therapy techniques and motivational interviewing under the supervision of the faculty health psychologists during their patient experiences.

Results: By virtue of creating the experience for the trainees, there has been an increase in interdisciplinary cooperation between the sleep departments and the obesity center's faculty, with a concentrated effort to share education materials for curriculum development. During their direct patient contact experiences, trainees will generate case conceptualization forms that capture the different elements of the patient's experience contributing to their sleep pattern with feedback provided. The learners will also complete a knowledge assessment at the conclusion of the experience on the topics that have been discussed. Data collection around the learner clinical and interdisciplinary competencies is ongoing.

Conclusion: Although there have been previous studies regarding the value of interdisciplinary care for insomnia, this would set the foundation for a novel combination of an educational opportunity with an expansion of the traditional interdisciplinary care team for treatment of the condition. There is also limited data on interdisciplinary education with direct patient care. An ongoing effort has been undertaken to collect additional data around the patient perception of the impact of interdisciplinary coordination on their experience and trainee confidence to provide interdisciplinary care.

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1244

ASSOCIATION BETWEEN URINARY METABOLITES OF VOLATILE ORGANIC COMPOUNDS AND OBSTRUCTIVE SLEEP APNEA-RELATED SYMPTOMS: EVIDENCE FROM KNHANES (2020–2021)

Sungroul Kim¹, Birhan Legese Gurmu¹, Kwang Ik Yang², Jinhee Bae³, Dooah Choi⁴, Jinsoo Park¹, Yongbae Kim¹, Ana Rule⁵

¹Soonchunhyang University, ²Soonchunhyang University Cheonan Hospital, ³GC Corp, ⁴Hurray Positive, ⁵Johns Hopkins Bloomberg School of Public Health

Introduction: Obstructive sleep apnea (OSA) is a widespread sleep health issue linked to factors, such as obesity; however, the role of environmental pollutants is gaining attention. We investigated

the association between volatile organic compound exposure levels and OSA-related symptoms in a nationally representative sample of 759 South Korean adults (aged ≥ 40 years) from the 2020–2021 Korea National Health and Nutrition Examination Survey (KNHANES).

Methods: OSA-related symptoms were assessed using the first three questions (snoring, tiredness, and observed apnea) of the STOP-BANG screening tool applied by the KNHANES. The participants were grouped as symptomatic ("yes" to all three) or asymptomatic ("no" to all three). We analyzed nine urinary volatile organic compound metabolites adjusted for creatinine concentrations which were available in the KNHANES dataset. Logistic regression models were used to explore the association between these biomarkers and OSA symptoms, adjusting for covariates, including body mass index, age, sex, blood pressure, socioeconomic factors, and smoking status.

Results: Our analysis revealed significant sex-specific differences between groups. In men, a high concentration of N-acetyl-S-(3,4-dihydroxybutyl)-L-cysteine, a metabolite of 1,3-butadiene, was associated with increased odds of OSA-related symptoms (adjusted odds ratio = 1.005, 95% confidence interval: 1.002–1.008). This association was not statistically significant in women, possibly because of few symptomatic cases or metabolic differences.

Conclusion: This study provides new insights into environmental risk factors for OSA in an Asian population. Our findings suggest that exposure to pollutants, such as 1,3-butadiene, may contribute to increased OSA prevalence, particularly among men.

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1245

BLACK WOMEN NAVIGATING STRESS & SLEEP SINCE THE 2024 US ELECTION

Judite Blanc¹, Lunthita Duthely¹, Azizi Seixas², Mairead Moloney¹, Girardin Jean-Louis², Deborah Jones Weiss¹

¹University of Miami Miller School of Medicine, ²University of Miami

Introduction: Black women in the United States frequently face cumulative and intersecting stressors, including economic hardship, caregiver burden, racial discrimination, and gender bias—factors that contribute to challenges with mental health, cardiovascular health, and sleep health. Although mobile health tools have been developed, many digital interventions do not adequately address the specific needs of Black women, as effective and equitable solutions must be grounded in their lived experiences and cultural context. This study explored the utility of mobile, virtual reality (VR) based interventions to address mental health, cardiovascular health, and sleep health challenges among Black women.

Methods: As part of a multi-phased, NIH-funded clinical trial (The Realist Women Study- NCT06544902), 84 Black women were screened nationwide. The qualitative phase included three structured focus groups (n = 16; age range 21–63) conducted in December 2024 and twelve individual interviews conducted in March 2025. The purpose of the initial, qualitative phase was to explore

the lived experiences of intersectional stress, sleep, and cardiovascular health of diverse Black women in the US, with a specific focus on their experience with VR solutions for mental wellness.

Results: Six major themes emerged: personal loss; systemic challenges; varied definitions of resilience; the Superwoman Schema; concerns about heart and sleep health; and the potential role of technology in promoting self-care. While some participants express that their sleep health is improving, others report a decline. Participants describe aspects of sleep timing, defined as the specific hours they sleep, and identify factors contributing to their sleep health. These include insomnia, sleep apnea, COVID-19 stress, mental health concerns, caregiver burden, workplace pressure, and the current political climate in the United States, which is a source of anxiety that disrupts their schedule and sleep. Study participants describe a range of strategies and sources of support they use to manage their sleep, noting that some approaches may be healthier than others. For instance, some individuals report using their phones to fall asleep.

Conclusion: Virtual reality (VR) was perceived as a promising tool for stress reduction, particularly when culturally tailored. However, barriers such as limited digital literacy, high equipment costs, and unfamiliarity with VR-based health programs were noted.

Support (if any):

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1246

EXAMINING UNADDRESSED NEEDS IN NARCOLEPSY TYPE 1 CARE TO INFORM CLINICAL PRACTICE IMPROVEMENTS

Bruce Corser¹, Lois Krahn², Phyllis Zee³, Jeff Carter⁴, Jacqueline Maytorena⁴, Cherilyn Heggen⁴, Kali Olson⁴, Larissa Jarzylo⁴

¹Intrepid Research, ²Mayo Clinic, ³Northwestern University Feinberg School of Medicine, ⁴PRIME Education

Introduction: As targeted treatments for narcolepsy type 1 (NT1) emerge, timely diagnosis and care planning are essential to optimize outcomes. This ongoing initiative aims to identify and address barriers to NT1 recognition and treatment to support practice improvements and patient-centered care.

Methods: Patient surveys (N=38) were collected in August 2025 through collaboration with the Hypersomnia Foundation to inform an ongoing initiative at five US sleep centers. Results from patient surveys are reviewed at expert-led clinic-based sessions to identify patient needs in care, and case-based discussions challenge participants to apply the latest evidence into practice scenarios. Pre- and post-session surveys are designed to measure the impact on knowledge, confidence, and self-reported performance. Additionally, clinicians will develop strategies for care improvement.

Results: The top patient-reported barriers to NT1 diagnosis were finding a provider familiar with sleep disorders (42%) and limited appointments/referrals (26%). Ninety-five percent waited over 1 year for formal diagnosis (1-5 years, 71%; 5-10 years, 19%; >10 years, 5%). Narcolepsy symptoms had a significant impact on daily living (82%; 4 or 5 on a 5-point Likert scale), with many patients reporting fatigue (63%), excessive daytime sleepiness

(58%), disrupted nighttime sleep (53%), sleep paralysis (50%), and cataplexy (37%) despite treatment. Patients' top treatment goals were finding a treatment that is effective for their symptoms/type of narcolepsy (61%) and that improves daily functioning/quality of life (55%). However, 19% (1, 2, or 3 on a 5-point Likert scale) reported their care team had not discussed treatment options and 37% (1, 2, or 3 on a 5-point Likert scale) were not routinely asked about treatment goals. Patients were interested in discussing the cause of narcolepsy (63%) and their preferences for treatment (61%). Preliminary findings from the clinic-based sessions have generated practical strategies to address identified gaps in NT1 care.

Conclusion: Patient surveys uncovered persistent challenges in NT1 diagnosis, communication, and treatment planning. Incorporating these perspectives and case-based scenarios into clinic-based sessions have the potential to improve focused approaches to care and can provide a foundation for integrating evidence into practice as the NT1 landscape evolves.

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1247

GAPS IN SLEEP EDUCATION ACROSS HEALTH AND BEHAVIORAL HEALTH PROFESSIONS WORLDWIDE: A MISSED OPPORTUNITY FOR FOUNDATIONAL TRAINING

Christine Spadola¹, Christopher Gordon², Bruno Saconi³, Elizabeth Keys⁴, Bandana Saini⁵, Ilene Rosen⁶

¹The University of Texas at Arlington, ²Macquarie University, ³Penn Medicine, ⁴The University of British Columbia, ⁵The University of Sydney, Sydney Pharmacy School, ⁶Univ Pennsylvania

Introduction: Sleep is increasingly recognized as a foundational pillar of health at individual, community, and societal levels. Despite this, sleep health education remains limited in most health and behavioral health training programs. Strengthening sleep education is essential, as health and behavioral health clinicians routinely encounter patients with inadequate sleep duration, quality, and/or sleep-related disorders and concerns. The interdisciplinary and international team of authors, comprising nursing, medicine, social work, and pharmacy, conducted a comprehensive scoping review of the peer-reviewed literature to assess accounts of sleep education for health and behavioral health care professionals.

Methods: The scoping review was registered with Open Science Framework. The authors systematically searched Medline, Embase, PsycInfo, ERIC, CINAHL, and IPA using targeted keywords and MeSH terms. Articles published from 2019 onward were eligible for inclusion. Exclusion criteria included articles not published in English, French, or Portuguese, as well as those that did not assess the sleep education provided. Screening at both title/abstract and full-text stages was performed independently by two reviewers; disagreements were resolved by a third reviewer. Studies were classified by health professional discipline.

Results: A total of 8,275 records were identified. After removing duplicates, 4,552 records remained and were screened. Of these,

4,367 were excluded. Full text was assessed for 175 articles, and 141 were excluded for the following reasons: no training or education component (77), non-health professional focus (8), ineligible study type (37), knowledge-only surveys (85), or other reasons (19). Ultimately, 34 studies were included in the scoping review. Sleep health education or training was most implemented within nursing (n=14) or medicine (n=9) professional programs.

Conclusion: Sleep plays a critical role in physical and mental health, yet formal sleep health education remains limited and uneven across health and behavioral health professions. Although extensive research demonstrates the prevalence and impact of sleep problems, existing training efforts are fragmented. The field now needs coordinated action to translate this evidence into consistent educational standards. We propose a focus on foundational sleep health education within health and behavioral health disciplines, as well as discipline-specific sleep health education tailored to the diverse needs of the patients served.

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1248

REDEFINING CATAPLEXY: A PATIENT-DERIVED VISUAL SEVERITY SCALE AND LINGUISTIC AUDIT

Solomon Briggs
Narcoleptic

Introduction: Cataplexy, a core symptom of Type 1 Narcolepsy, is defined as the intrusion of REM muscle atonia into wakefulness. However, current clinical verbiage lacks clarity, specifically the reliance on the term "muscle weakness." This ambiguity causes confusion, often conflating the specific neurological loss of muscle tone (ranging from mild laxity to complete paralysis) with the generalized fatigue or "sleep attacks" common in Hypersomnolence disorders. This resource proposes a shift in clinical discourse by introducing a visual and descriptive framework that more accurately captures the distinct phenomenology of cataplexy, separating the event from sleepiness.

Methods: Synthesizing the author's lived experience with years of Narcolepsy community engagement, this project contrasts standard clinical definitions against shared patient realities. Digital art was utilized to translate the unseen depths of the lived experience into a comprehensive framework. This qualitative synthesis integrates the broad spectrum and severity ranges of the symptom to create a tangible reference for clinicians and patients.

Results: The resource focuses on two primary components to bridge the communication gap: The Visual Severity Scale: This spectrum differentiates episodes into "Minimal-Partial" (internal sensations, facial/neck droop, difficulties with speech), "Moderate-Partial" (leaning against a wall for support, loss of postural control), and "Severe-Complete" (overwhelming sensory experiences, melting or collapsing into a temporary paralysis). This visualization highlights the diverse variability and expansiveness of the symptom's presentation. Linguistic Audit: The

resource argues that "weakness" is a reductive descriptor that semantically aligns with fatigue and minimizes the symptom's broad severity range. Clearer alternatives are proposed, such as "loss of muscle tone," "muscular interference," "disruption," or "dissipation." These terms distinctively characterize the intrusion of atonia, distinguishing the mechanism from the heaviness of sleepiness.

Conclusion: By replacing ambiguous terminology and providing a visual spectrum of severity, this resource provides a necessary vocabulary for patients to articulate a difficult symptom more effectively and thoroughly. This framework improves the discussion between patient and provider, allowing clinicians to more accurately distinguish the neurological event of cataplexy from sleepiness, ultimately facilitating clearer diagnosis and management.

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1249

SLEEP AWAKENED: EXPANDING HORIZONS IN HEALTH AND MULTIDISCIPLINARY RESEARCH

Isabela Ishikura¹, Allan Porcaccia¹, Sergio Tufik¹, Monica Andersen²

¹Universidade Federal de São Paulo, ²Departamento de Psicobiologia, Universidade Federal de São Paulo

Introduction: Sleep has been recognized as one of the 3 pillars for good health, alongside physical activity and diet. These components are interrelated and have been contemplated in studies from different fields of health sciences. Due to the growing recognition that sleep science has been gaining in literature, we aimed to investigate the increase in publications of sleep in different categories of health science journals, and what are the main sleep disturbances/aspects published.

Methods: It was evaluated the top 10 journals with higher impact factors of each of the following categories according to Journal Citation Report: Psychology; Nutrition & Dietetics; Pediatrics; Dentistry, Oral surgery & Medicine; Geriatrics & Gerontology; and Sports Sciences. A search using the term "sleep" was performed at journal's website restricting the date in 3 timeframes (T): Jan/2010 to Dec/2014 (T1), Jan/2015 to Dec/2019 (T2) and Jan/2020 to Sep/2025 (T3). The total number of publications and the percentage increase between periods was determined. Sleep-related terms most published in each category were achieved.

Results: All categories showed an increase in sleep-related publications between timeframes, with a more pronounced rise between T2 and T3, mainly in Geriatrics (362%) and Nutrition (124%). The overall percentage increase from T1 to T3 was greatest in Geriatrics (629%) and Sports Sciences (251%). "Sleep quality", "insomnia", "sleepiness" and "obstructive sleep apnea" were the terms with more publications.

Conclusion: Different categories of journals have been recognizing the relevance to include sleep as a variable in the studies. Our

research shows scientists are increasingly focusing on how sleep impacts health and quality of life.

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1250

SLEEP DISORDERS AND SYMPTOMS AMONG FORMER PROFESSIONAL AMERICAN-STYLE FOOTBALL PLAYERS: THE FOOTBALL PLAYERS HEALTH STUDY

Asiah McWhorter¹, Rachel Grashow², Adam Tenforde³, Michael Rueschman⁴, Ross Zafonte⁴, Meagan Wasfy⁵, Susan Redline⁶, Suzanne Bertisch⁴

¹Morehouse School of Medicine, ²Harvard T.H. Chan School of Public Health, ³Harvard Medical School, ⁴Brigham and Women's Hospital, ⁵Massachusetts General Hospital, ⁶Brigham and Women's Hospital and Harvard Medical School

Introduction: Former professional American-style football (ASF) players experience a high burden of chronic health conditions. While prior studies suggest a strong relationship between ASF participation and sleep-related disorders, the prevalence and clinical characteristics of these conditions in retired players have not been fully described. In this context, we assessed the prevalence of sleep disorders and symptoms among former professional ASF players and explored differences by position (linemen vs. non-linemen).

Methods: The Football Players Health Study (FPHS) at Harvard University is an epidemiological cohort of approximately 5,000 former ASF players. Among this cohort, 111 participants enrolled in an in-person study that oversampled former players with zero, one, or more than three chronic health afflictions. Data collection included overnight polysomnography and self-reported sleep questionnaires. Primary outcomes included PROMIS Sleep Disturbance and Sleep-Related Impairment scores, and Apnea-Hypopnea Index (AHI). Secondary outcomes included fatigue and restless legs symptoms. Exploratory outcomes included polysomnographic- total sleep time, sleep efficiency, periodic limb movements, and arousal index.

Results: The sample included 62 linemen and 49 non-linemen, with similar mean age between groups (48.1 vs. 48.4 years; $p = 0.844$). Participants demonstrated mildly elevated Sleep Disturbance scores (51.9 ± 8.7) with normative Sleep-Related Impairment (49.3 ± 9.1). Race differed by position ($p = 0.002$), with linemen more often White (59.7%) and non-linemen more often Black (69.4%). Linemen had higher BMI than non-linemen (35.5 vs. 29.8 kg/m²; $p < 0.001$). Diagnosed sleep apnea was more prevalent among linemen (14.5%) than non-linemen (0%; $p < 0.01$). Despite differences in BMI and OSA diagnoses, PROMIS sleep disturbance, sleep-related impairment, and fatigue scores were similar between groups. Non-linemen reported a higher

frequency of restless leg symptoms (36.0% vs. 17.2%), though results were imprecise. Median AHI (8.5 linemen, non-lineman 9.2), sleep architecture, and exploratory outcomes did not differ by lineman status.

Conclusion: Although linemen had higher BMIs and history of diagnosed OSA, sleep disturbance and sleep-related impairment were similar across positions. Future characterization former AFL players could further identify the associations between sleep and commonly comorbid conditions, including pain, concussion history, post-career psychosocial stressors, or cardiometabolic disease to identify sleep intervention targets.

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1251

SLEEP HEALTH TRAINING AMONG RECENT GRADUATES FROM PROFESSIONAL PSYCHOLOGY PROGRAMS

Ivan Vargas¹, Emma Janes¹, Abigail Vance², Arash Assar¹, Mara Egeler¹

¹University of Notre Dame, ²University of Alabama

Introduction: While sleep and circadian rhythm disorders are highly prevalent (e.g., chronic insomnia alone affects approximately 32 million adults in the United States), it appears that few health providers are adequately trained to assess and treat sleep problems. As of 2025, there are less than 275 practitioners board certified in behavioral sleep medicine. Most are psychologists and represent approximately 0.3% of psychologists in the U.S. More broadly, it's unclear to what extent psychology trainees learn about sleep. The present study aimed to quantify the extent to which recent graduates from psychology programs received training in sleep, feel comfortable providing sleep-related services, and meet basic competencies in sleep health.

Methods: We surveyed 174 recent graduates (within the past 10 years) from professional psychology programs (i.e., clinical or counseling psychology PhD or PsyD) in the United States. Respondents provided demographic information and answered questions about their prior training and experiences working with patients who have sleep or circadian rhythm concerns. The sample was primarily young (mean age = 34.9 years), identified as women (81%), and White (80%). 77% of respondents reported being licensed in their state. A subset of participants ($n = 35$) were randomly invited to complete a brief health assessment to evaluate their sleep health knowledge and competency.

Results: Approximately three-quarters of respondents reported receiving six hours or less of formal educational training related to sleep, sleep disorders, or circadian rhythms during graduate school (73.0%) and postgraduate training (75.3%). A large proportion of respondents reported feeling not or only a "little" prepared to assess (43%) and treat (41%) sleep-related problems. Similarly, 40% reported feeling not or only a "little" confident in treating insomnia disorder. Among participants who completed the sleep health assessment, the mean score was 69.8% ($SD = 9.0$; Range = 40.0 – 82.9).

Conclusion: While the present findings are primarily descriptive, they provide insight into the training, experiences, and relative competency of professional psychologists. That is, in this sample of recent graduates from psychology programs, the majority endorse having minimal training and comfort working with sleep-disordered populations. This is also consistent with more objective metrics of competency.

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1252

STRUGGLING FOR AIR? A CROSS-SECTIONAL ANALYSIS OF SLEEP APNEA GUIDANCE ON SOCIAL MEDIA

Alexandra Filipkowski¹, Jay Kavia¹, Grace Smithwick¹, Manya Sinha¹, Priyanka Mehta¹, Rachel Kaye², Wayne Hsueh²

¹Rutgers New Jersey Medical School, ²Department of Otolaryngology - Head & Neck Surgery, Rutgers New Jersey Medical School

Introduction: Obstructive sleep apnea (OSA) is a common and frequently underdiagnosed disorder characterized by recurrent upper-airway collapse during sleep, resulting in fragmented sleep, daytime fatigue, and increased cardiometabolic risk. With the growing popularity of online health information, TikTok has become a major platform through which patients learn about symptoms, diagnostic pathways, and treatment options. Despite its influence, little is known about the accuracy or quality of content shared on this platform for sleep apnea. This study evaluates the reliability, thematic content, and creator characteristics of TikTok videos addressing sleep apnea.

Methods: The top 50 videos under each of the hashtags #sleepapnea and #obstructivesleepapnea were collected using a publicly available scraping tool, yielding 100 unique videos. After excluding non-English posts, 97 videos remained. Two independent reviewers categorized creator type (medical vs non-medical) and video style (informational, personal, or humorous). Informational content was evaluated using DISCERN, modified DISCERN, and the Patient Education Materials Assessment Tool (PEMAT). Overall video quality was assessed using the 5-point Global Quality Scale. Statistical comparisons were performed using Fisher's exact tests and unpaired t-tests.

Results: Among 97 videos, 52 were informational, 27 personal, and 18 humorous. Common themes included diagnostic processes, treatment options, lifestyle factors, physiologic explanations, and symptom-management tips. Informational videos demonstrated average DISCERN scores of 36.90 ± 7.17 (out of 80) and mDISCERN scores of 2.53 ± 0.42 (out of 5). PEMAT scores showed 78.7% understandability and 63.2% actionability. Personal videos received significantly more views than informational videos ($p=0.0088$), while informational videos had higher Global Quality scores ($p=0.0001$). Medical professionals produced significantly higher-quality content overall ($p=0.0001$), though no significant differences were found in views or interactions between medical and non-medical creators.

Conclusion: TikTok content related to sleep apnea varies widely in accuracy and quality. Personal, non-informational videos attract more engagement than medically accurate content, highlighting an opportunity for clinicians to create accessible, evidence-based educational materials. Increasing expert participation on social media may improve public understanding of sleep apnea and support appropriate care-seeking.

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1253

THE DISCOURSE OF HEALTHY GAMING: ASSOCIATIONS OF SLEEP HEALTH EDUCATION DELIVERY WITHIN COLLEGIATE ESPORTS ATHLETES

Brooks Youngmark¹, Jeffrey Milroy², Michael Perko², Stephen Hebard³, David Wyrick³

¹James Madison University, ²UNC Greensboro, ³Prevention Strategies

Introduction: Collegiate esports continues its rapid growth, and esports athletes are a unique population with distinct lifestyles, and require health education to fit their needs. As such, they share a common risk factor that exacerbates global health inequities and contributes to overall health of all people: risks related to sleep health. Recognizing the lived environment and modes of delivery is imperative to meet the needs of this unique population. The purpose of this study is to evaluate the effectiveness of a tailored sleep health intervention to collegiate esports athletes based on attitudes and beliefs from prior established health education theoretical frameworks and models.

Methods: 38 collegiate esports athlete participants were randomly sampled into three groups: a comparison group receiving passive educational messaging within a home esports arena, a group receiving the intervention on Discord®, and an in-person group receiving traditional face to face education in their esports arena. Surveys were administered post-intervention to determine effects on attitudes and beliefs of sleep health within the context of esports competition on a 5 point Likert scale. ANOVA and subsequent post-hoc testing due to small sample size was conducted to compare the means of attitudes and beliefs across the groups and explore all potential relationships and address unequal sample sizes.

Results: Composite data for In-person, Discord®, and comparison groups regarding attitudes ($M=4.7417$; 4.5156; 4.3156) and beliefs ($M=4.5833$; 4.4756; 4.1556) did not display statistical significance in the ANOVA between all three comparison groups in both attitudes and beliefs constructs ($p=.115$; $p=.118$). Post-hoc testing found statistical significance within the Least Significant Difference (LSD) test between the In-person group and Comparison group regarding attitudes ($p=.041$; $p=.240$ [Discord®]) and showed the closest association to 95% confidence in beliefs ($p=.068$; $p=0.100$ [Discord®]) Tukey's and SNK testing did not find statistical significance across any delivery conditions for attitudes and beliefs, respectively ($p=0.79$; $p=0.130$).

Conclusion: In-person delivery of sleep health education shows greater association in this pilot study for influencing attitudes regarding sleep health despite baseline lack of statistical significance from ANOVA, though implications of post-hoc data highlight a need for future study to further assess relationships between different modes of delivery.

Support (if any):

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1254

UNCOVERING BARRIERS TO EARLY RECOGNITION, ACCURATE DIAGNOSIS, AND MULTIDISCIPLINARY CARE OF NARCOLEPSY TYPE 1

Bruce Corser¹, Michael Thorpy², Jeff Carter³, Jacqueline Maytorena³, Cherilyn Heggen³, Alexandra Garcia-Moreno³, Larissa Jarzylo³

¹Intrepid Research, ²Albert Einstein College of Medicine, ³PRIME Education

Introduction: Narcolepsy Type 1 (NT1) is often under-recognized, partly due to symptom overlap with other sleep and psychiatric disorders. With emerging therapies targeting orexin deficiency, timely and accurate diagnosis is critical. This program aimed to characterize current challenges faced by clinicians in NT1 recognition, diagnosis, and management, and to identify potential strategies to support practice improvement.

Methods: This ongoing, multi-phase initiative involved five in-clinic educational sessions across U.S. sleep centers and a national symposium held at SLEEP 2025. Clinicians completed pre- (n=99) and post-session (n=57) or pre- (n=175) and post-symposium

(n=165) surveys assessing perceived challenges around NT1 diagnosis and care. A longitudinal follow-up survey will evaluate how site-specific strategies developed during the sessions were sustained in clinical practice.

Results: Across in-clinic sessions, clinicians identified key barriers to timely NT1 recognition and diagnosis, including overlapping symptoms with other sleep or psychiatric disorders (50%), lack of familiarity with diagnostic criteria (32%), and limited reporting of cataplexy (35%). System-level challenges included inconsistent knowledge of diagnostic criteria across multidisciplinary teams (27%), and difficulty coordinating referrals across health systems (40%). To address identified gaps, clinicians proposed strategies including integrating the Epworth Sleepiness Scale into assessment and referral workflows and enhancing clinician education on pathophysiology and symptom recognition. Teams committed to increase NT1 symptom screening during visits and regularly discuss emerging therapies and clinical data. Insights from the national symposium aligned with these findings, with the top challenge identified as differentiating NT1 from other disorders. Following the sessions, knowledge of pathophysiology including the role of orexin deficiency increased from 44% to 89%, confidence in differentiating NT1 from other disorders improved from 47% to 86%, and familiarity with emerging treatment mechanisms and clinical trial data rose from 42% to 82% (all Likert 3/4/5), suggesting that targeted educational programs can help address current challenges in NT1 care.

Conclusion: This initiative highlighted national barriers to NT1 recognition and diagnosis and identified actionable strategies, including enhanced symptom screening, team education, care coordination, and review of emerging therapies, to support timely, accurate, and multidisciplinary NT1 management.

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1255

LONGITUDINAL MODELING OF SLEEP TIMING, DURATION, AND SOCIAL JETLAG ACROSS THE ADULT LIFESPAN USING HIGH-RESOLUTION WEARABLE DATA

Mason Manetta¹, Angus Burns², Shea Andrews¹, Yue Leng¹, Diego Mazzotti³

¹University of California, San Francisco, ²Harvard Medical School,

³University of Kansas Medical Center

Introduction: Reliable longitudinal sleep measurements are critical for chrono-epidemiology, as misalignment and variability are strongly associated with chronic diseases. Self-reporting methods or short-term monitoring can fail to capture longer term patterns required for risk stratification. Therefore, we used device-measured sleep data from the All of Us (AoU) research program to characterize age, sex, and environmental contributors to sleep patterns.

Methods: We analyzed 22,428,610 nights of filtered Fitbit sleep data from 42,290 AoU participants. We calculated nightly onset, offset, and duration, excluding non-primary sleep and episodes >18h. Linear Mixed-Effects Models (LMMs) with person as random effects were used to control for employment, weekend status, sex, seasonality, and age incorporating quadratic age terms and employment weekend interactions.

Results: The cohort (71% White, 67% Female, 52 ± 17y) contributed a median of 109 nights (mean: 530) of recorded sleep (mean duration 7.45h, median 7.53h). All reported associations were significant ($p < 0.001$). Age showed a quadratic trend in sleep timing across the lifespan. Sleep midpoint showed a maximum advance of ~42 minutes between young adulthood (age 18, 2:37 AM) and older age (age 57, 1:54 AM). Sleep duration increased with age gaining over 34 minutes between ages 18 (7.45h) and 85 (8.02h). Furthermore, the employment-weekend interaction showed a delay in midpoint, onset, and offset and increased duration across all groups. Participants "Employed for Wages" showed the greatest social jetlag (average midpoint delay) of ~42 minutes on weekends (4:08 AM) compared to weekdays (3:26 AM). This shift was accompanied by a duration extension of ~28 minutes on weekends (7.95h) vs. weekdays (7.48h). Finally, seasonality analysis revealed an 11-minute decrease in sleep duration in June compared to the maximum observed in January.

Conclusion: This large-scale analysis confirms that sleep timing and duration are dynamically determined by non-linear age effects, strong social constraints, temporal effects, and measurable environmental factors. Our findings provide population-level characterization essential for future genetic and clinical studies targeting personalized interventions for circadian misalignment.

Support (if any): All of Us Research Program, Office of the Director, NIH

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1256

DAILY STRESS AND OBJECTIVE SLEEP OUTCOMES IN A REAL-WORLD SAMPLE OF OVER 83,000 U.S. ADULTS

Sameera Menon¹, Sasha Milton¹, Andrew Cotton-Clay², Susan Baron², Laura Fava², Venkat Easwar², Arthur Kinsolving², Philippe Kahn², Jenny Zitser³, Clete Kushida⁴, Yue Leng¹

¹University of California, San Francisco, ²Fullpower Technologies, Inc., ³Movement and Sleep Disorders Unit, Neurology Department, Tel Aviv Sourasky Medical Center, Israel, ⁴Stanford University

Introduction: While daily stress is believed to affect sleep, associations with objective sleep architecture in large real-world samples are not well established. Using longitudinal data from nearly 2 million nights captured by a noninvasive under-mattress monitoring device, we tested whether reports of daily stress were associated with differences in sleep duration, sleep stages, and sleep disturbance indices.

Methods: From 11/15/2023-11/14/2025, overnight sleep across 83,288 U.S. adults (1,982,889 nights) was recorded using the Sleeptracker-AI Monitor (Fullpower Technologies Inc., California, USA), which continuously captures sleep stages, respiration, and movement via piezo-electric sensors. Individuals responded each day to the question: "Was your day stressful?" with three options: stress-free, normal, or stressful. Outcomes included total sleep time (TST), wake after sleep onset (WASO), REM sleep percentage, deep sleep percentage, arousal index (AI), and breathing anomaly index (BAI). We used mixed linear models with participant as a random effect to estimate the percentage changes in sleep parameters associated with self-reported daily stress.

Results: The sample was 47% female and had a mean age of 51.6±14.5 years. Relative to "stress-free" days, "normal" days were associated ($p < 1 \times 10^{-6}$ for all) with 0.9% lower TST (standard error [SE]=0.04%), 1.4% lower WASO (SE=0.13%), 1.0% higher REM sleep percentage (SE=0.06%), and 1.7% higher deep sleep percentage (SE=0.10%); and "stressful days" were associated with 2.6% lower TST (SE=0.05%), 0.9% higher WASO (SE=0.18%), and 3.5% higher deep sleep percentage (SE=0.14%). Lower BAI and AI were also observed on "normal" (BAI: -0.3%, SE=0.11%; AI: -0.7%, SE=0.06%), and "stressful" days (BAI: -1.3%, SE=0.16%; AI: -1.7%, SE=0.09%), relative to "stress-free" days ($p < 0.001$).

Conclusion: In this large real-world sample, subjective daily stress ratings were associated with significant differences in objective sleep measurements. Higher daily stress was linked to shorter TST, higher WASO, higher REM and deep sleep percentages, and lower breathing anomaly index and arousal index. Future work should explore how daily stress interacts with individual sleep patterns over time. Continued use of large-scale at-home monitoring will be central to understanding these relationships in real-world settings.

Support (if any): Fullpower Technologies

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1257

PERSISTENT REDUCTION IN REM SLEEP FOLLOWING THE SPRING DAYLIGHT SAVING TIME TRANSITION IN A LARGE REAL-WORLD COHORT

Rafael Branco¹, Sasha Milton¹, Andrew Cotton-Clay², Susan Baron³, Laura Fava³, Venkat Easwar³, Arthur Kinsolving³, Jennifer Zitser⁴, Philippe Kahn³, Clete Kushida⁴, Yue Leng¹

¹University of California, San Francisco, ²University of California, Santa Barbara, ³Fullpower Technologies, Inc., ⁴Stanford University

Introduction: The spring transition into Daylight Saving Time (DST) introduces an abrupt one-hour shift that may disrupt sleep

beyond the first night. It remains unclear how sleep architecture changes during the weeks before and after this transition.

Methods: We examined 117,578 U.S. adult users (~2.67 million nights; 39.5% female; mean age=47±12.8 years) of a commercially available under-mattress device (Sleeptracker-AI Monitor, Fullpower Technologies Inc., California, USA). Sleep architecture data was gathered from two weeks prior to DST (2/22/25) to one week after (3/21/25), labeled weeks -2, -1, 0 (week of DST), and 1. To understand DST's immediate impact, we compared sleep parameters on the Sunday DST began to the two previous Sundays using Welch's t-tests. Next, after excluding week-ends, we computed each participant's mean weekly metrics for weeks -2 through +1 and compared them using Welch's t-tests.

Results: In comparison to the previous two Sundays, the first night of DST exhibited shorter total sleep time (TST) (week 0 vs. -2: -13.7 min; week 0 vs. -1: -12.9 min) and lower REM% (week 0 vs. -2: -0.11%; week 0 vs. -1: -0.14%; $p < 0.001$ for all comparisons). However, TST returned close to pre-DST levels during week 0, remaining only slightly lower than in weeks -2 (week 0 vs. -2: -0.63 min) and -1 (week 0 vs. -1: -1.1 min; $p < 0.01$ for both comparisons). By week +1, TST no longer differed from weeks -2 or -1 ($p > 0.05$). In contrast, REM% remained lower in both weeks 0 (week 0 vs. -2: -0.18%; week 0 vs. -1: -0.24%) and +1 (week +1 vs. -2: -0.06%; week +1 vs. -1: -0.12%) relative to pre-DST levels ($p < 0.0001$ for all comparisons). We didn't observe any significant changes in weekday deep sleep proportion following DST.

Conclusion: In a large real-world sample, we found that although both REM% and total sleep time (TST) decreased on the first night of DST, only TST returned to pre-DST levels in the subsequent weeks, whereas the reduction in REM% persisted. These findings may help explain ongoing sleep complaints following spring DST and underscore the value of at-home sleep technologies for understanding real-world sleep patterns.

Support (if any): Fullpower Technologies.

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1258

IS MY SLEEP TRACKER TRACKING MY (REM) SLEEP? COMPARISON OF TWO CONSUMER SMARTWATCH DEVICES TO POLYSOMNOGRAM, IN A SLEEP CLINIC REFERRAL POPULATION

Eric Abreu¹, Ana Rocha², Sushmita Shrestha³, Umer Shoukat², Pratap Reddy², Roopika Reddy², Thomas Wasser⁴, Alec Platt²

¹Rowan Virtua School of Osteopathic Medicine, ²Respiratory Specialists, ³Baylor Scott and White, TX, ⁴Consult-Stat

Introduction: The popularity of consumer sleep-tracker smartwatch technology continues to grow, but uncertainty remains over data accuracy and applicability to patients with sleep disorders.

Methods: Subjects undergoing evaluation for sleep disorders at a single sleep center (Wyomissing, PA), during a 16-month period ending September 2025, were enrolled in the study on the night of their scheduled polysomnogram (PSG). Subjects wore Fitbit Inspire 3 (FBI3) and Garmin VivoSmart 5 (GVS5) sleep-tracker devices during the PSG. Summary sleep staging data (total rapid eye movement [REM] sleep and total sleep time [TST]) were analyzed by descriptive statistics, paired Student's t-Test, and

equivalence testing (using Two One-Sided Tests [TOST]), versus gold-standard PSG.

Results: A total of 110 subjects enrolled; 92 provided complete data. Subjects were excluded from the analysis due to early termination of PSG ($n=2$) or sleep-tracker device failure (FBI3 [$n=13$]; GVS5 [$n=8$]). Total minutes of REM sleep mean $\pm$ standard deviation (SD) were similar across devices: PSG 66.9 (SD 30.7), FBI3 70.0 (SD 27.5) and GVS5 70.0 (SD 44.5) minutes. Paired Student's t-Test showed no significant difference in PSG total REM sleep compared to FBI3 ($t=0.95$, $p=0.35$) or GVS5 ($t=0.63$, $p=0.53$). Testing of equivalence using TOST (employing prespecified 90% upper and lower confidence intervals of ± 10 minutes), demonstrated that FBI3-measured REM sleep was equivalent (i.e., no substantial differences in means) to PSG-measured REM (mean difference -3.1 min [CI -8.5; +2.3]); GVS5 sleep-tracker did not meet equivalence (mean difference -3.1 min [-11.3; +5.1]). Sleep-tracker devices measured total sleep time with comparatively less accuracy: PSG 355.1 (SD 69.8) minutes; FBI3 365.9 (SD 77.1) minutes; GVS5 444.9 (SD 73.0) minutes. Although the FBI3 device-measured total sleep time did not differ significantly from PSG (Student's t-Test [$t=1.50$, $p=0.138$]), the GVS5 device highly overestimated TST ($t=10.4$, $p < 0.01$).

Conclusion: Among sleep medicine patients, sleep-tracker smartwatches provided potentially clinically relevant estimates of total REM sleep, but showed wider variability in measurements of total sleep time, depending on the device, compared to the gold-standard polysomnogram.

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1259

SHOULD WE TRUST NATIVE APPLE ALGORITHMS FOR DETECTING SLEEP ONSET IN CHILDREN?

Anna Pockrass¹, Marleigh Treger¹, Olivia Walch², Jennette Moreno³, Christopher Drake⁴, Philip Cheng⁴

¹Henry Ford Sleep Research, ²Arcascope, University of Michigan,

³Baylor College of Medicine, ⁴Henry Ford Health System

Introduction: Sleep trackers such as Apple watches (AW) have proliferated in the consumer market, spurring the public onto sleep tracking. AW is currently the dominant smartwatch both globally (22%) and in the US market (59%). The public health impact of this is significant for youth because sleep is vital during critical windows of neural development. However, current users can only rely on information derived from black-box algorithms, many of which have not been tested for accuracy. The objective of this study was to assess the output of the native Apple algorithms in determining sleep onset times in children compared against a research-grade device and algorithm.

Methods: A community sample of 10 children aged 8-17 years (Mage = 13.70 $\pm$ 2.79) completed daily sleep diaries and wore an AW and Actiwatch on their non-dominant wrist for 14 days. A difference score was calculated for sleep onset time between each device and sleep diaries. One sample t-tests were conducted on the difference score for each device, and a paired samples t-test compared the two devices. False positive (device reporting sleep

during wake) and false negatives (device missing sleep events) rates were calculated for both devices.

Results: Both devices showed significantly different sleep onset times compared to sleep diaries (AW: mean = 5.9 hrs $\pm$ 2.3 SD, $p < .001$; Actiwatch: mean = 0.7 $\pm$ 0.4 SD, $p < .001$); however, the error for AW was significantly larger compared to the Actiwatch, $t(9) = 6.47$, $p < .001$. Whereas the Actiwatch had no false negative or positive events, the Apple native algorithms exhibited a false positive rate of 29.8% and a false negative rate of 6.0%.

Conclusion: Our findings suggest sleep onset times derived from native Apple algorithms are significantly less accurate compared to Actiwatch; however, given the scalability of AW, one solution may be to process raw accelerometry data from AW with validated open-access sleep algorithms, particularly in pediatric populations. This approach has shown promise in adults and needs to be tested in children.

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1260

A LARGE MULTITASK SOUND AI MODEL FOR COMPREHENSIVE SLEEP ANALYSIS FROM NOCTURNAL BREATHING SOUNDS

Seunghun Kim¹, EunSung Cho¹, Dongheon Lee¹, Joonki Hong¹, In-Young Yoon²

¹Asleep Inc., ²Seoul National University Bundang Hospital

Introduction: Recent sound-based AI models have shown strong performance in predicting sleep staging, obstructive sleep apnea (OSA) events, and snore detection from nocturnal breathing sounds. Prior studies have also demonstrated that breathing sounds contain physiological signatures related to oxygen desaturation, arousals, and sleep position. However, current models typically use a shared feature extractor followed by separate task-specific classifiers, leading to rapid growth in parameters and training time as the number of tasks increases. To address this, we converted one of the existing classifiers into a multi-head classifier that outputs multiple tasks via lightweight multilayer perceptron (MLP) heads, incurring minimal additional computational cost. This study evaluates the unified model across six sleep-related tasks.

Methods: The model integrates four tasks - OSA event, desaturation, arousal, and sleep position - into one shared classifier with lightweight MLP heads (sleep staging and snore detection retain their existing dedicated classifiers). The architecture processes 80 consecutive Mel-spectrogram frames representing each 30-second epoch. Training was performed using 2,973 nights of PSG data with synchronized audio, and evaluation was conducted on an independent dataset of 802 nights (age 50.5 $\pm$ 15.4; BMI 25.5 $\pm$ 3.6; AHI 21.2 $\pm$ 20.6; male:female = 530:272). All tasks, except sleep staging, were trained at the sub-epoch level but evaluated at the epoch level for comparison with previous single-task models.

Results: The unified model achieved performance comparable to single-task baselines. The three tasks maintained robust performance (sleep staging: macro F1 0.77, accuracy 80.6%; OSA: macro F1 0.78, accuracy 89.5%; snore detection: macro F1 0.89, accuracy

90.4%). The newly integrated tasks showed slight improvements relative to previously reported models: desaturation (F1 0.80, sensitivity 0.88, specificity 0.92 for desaturation-containing epochs), arousal (F1 0.67, sensitivity 0.74, specificity 0.91 for arousal-containing epochs), sleep position (F1 0.88, sensitivity 0.89, specificity 0.74 for supine epochs; overall accuracy 84.0%, macro F1 0.82).

Conclusion: The ability to jointly infer diverse sleep events from a single multi-head classifier suggests that these tasks rely on overlapping physiological representations. This scalable architecture enables efficient multitask learning without loss of accuracy and provides a strong basis for developing a sound-based foundation model capable of comprehensive sleep analysis.

Support (if any):

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1261

FEASIBILITY OF EEG-BASED WEARABLE DEVICES FOR GENERAL INPATIENT SLEEP MONITORING

Sahithi Mathukumilli¹, Daniel Levendowski², Sullafa Kadura³

¹University of Rochester, ²N/A, ³UPMC

Introduction: Accurate inpatient sleep measurement is challenging: polysomnography (PSG), the gold standard, is impractical for routine use due to cost, complexity, and poor tolerability. Actigraphy, while feasible, tends to overestimate sleep in patients confined to bed. EEG-based wearable devices may provide objective data with minimal disruption, but their feasibility and tolerability in general inpatient settings remain unclear. We hypothesized that patients with pre-existing sleep disorders would be less likely to tolerate an EEG wearable device.

Methods: We conducted a feasibility study using an EEG wearable headband (Sleep Profiler, Advanced Brain Monitoring) in inpatient adults. Participants wore the device overnight to record EEG, electrooculogram, and electromyogram signals for automated sleep staging. Tolerance was defined as wearing the device for the entire night. Baseline sleep measures included the Insomnia Severity Index (ISI), STOP-Bang, and baseline Epworth Sleepiness Scale (ESS). We compared sleep outcomes between those who tolerated and those who did not using t-tests and two-proportion z-tests.

Results: Of 140 patients approached, 61 consented and 35 (57%) successfully wore the device overnight. Common reasons for intolerance included discomfort (36%) and headband displacement (21%). ISI scores were similar between tolerant and intolerant groups (11.79 $\pm$ 7.30 vs. 11.88 $\pm$ 7.56, $p = 0.96$), as were ESS scores (8.0 $\pm$ 4.95 vs. 8.73 $\pm$ 4.98, $p = 0.58$) and STOP-Bang scores (3.04 vs. 3.58, $p = 0.20$). Sleep metrics did not differ significantly, suggesting the device did not disrupt sleep. Sleep metrics were also comparable: total sleep time (347 $\pm$ 172 vs. 420 $\pm$ 185 min, $p = 0.23$), sleep onset latency (28 $\pm$ 28 vs. 60 $\pm$ 100 min, $p = 0.10$), and wake after sleep onset (50 vs. 40, $p = 0.50$).

Conclusion: EEG-based wearable devices were tolerated by over half of participants, and tolerance was not associated with pre-existing sleep disorders. Although differences in sleep measures were not statistically significant, some gaps (e.g., 70 minutes in total sleep time) could be clinically meaningful. Further research should determine whether these differences impact

patient recovery or comfort and explore strategies to improve device wearability.

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1262

PERSONALIZING PAP COMFORT THROUGH AI-ENABLED MODELING: RETROSPECTIVE INSIGHTS AND FUTURE DIRECTIONS

Ruth Santizo, Chinh Nguyen, Himani Jayawardane, Yu Jia Tan, Rose Malonzo, Kristin Boyd, David Richards, Harley Koltai, Jai Carey, Jeff Armitstead, Demetria Buncum, Ross Deas
Resmed

Introduction: Personalizing positive airway pressure (PAP) comfort through machine-learning (ML)-derived insights may help improve early therapy comfort and long-term adherence. Personalized Therapy Comfort Settings (PTCS), FDA-cleared and marketed as Smart Comfort, is an AI-enabled medical device that provides personalized PAP comfort setting recommendations to support patients when using their compatible therapy device. We conducted retrospective analyses to evaluate whether model-guided comfort setting recommendations, developed using data from 1.4 million patients, were associated with improved PAP device usage and patient-reported early therapy experience.

Methods: Retrospective analyses using de-identified Resmed PAP therapy datasets were conducted to evaluate whether comfort settings aligned with model-recommended configurations (PTCS-Matched) were associated with improved outcomes when compared with Default or Other (non-PTCS/non-Default) settings. Propensity score matching (SMD < 0.10) controlled for imbalances between comparison groups. Outcomes included nightly usage, days used, residual AHI (rAHI), mask leak, and long-term discontinuation at 90 days and 1 year. Day-3 patient-reported outcome measures (PROMs) assessing early therapy experience were evaluated in patients who completed them.

Results: Datasets of over 900,000 AirSense11 device users between October 2022 – May 2025 were analyzed. Across retrospective comparisons, patients whose settings aligned with model recommendations (PTCS-Matched) showed improved PAP device usage when compared with Default configurations. For AS11 devices, PTCS-matched users demonstrated +20 minutes/night at 90 days, +15 minutes/night at 1 year, and +21 usage days at 1 year (all $p < 0.001$). Residual AHI remained well within clinical limits (< 5), mask leak differences were minimal, and AS11 discontinuation was slightly lower (−2.8%, $p < 0.001$). Findings were directionally consistent when compared against Other settings. Day-3 PROMs showed PTCS-Matched users were less likely to find therapy challenging than those on Default comfort settings (19.8% vs 26.5%; −5.9 pp; $p < 0.001$) and more likely to rate therapy as great (+2.7 pp; $p = 0.003$). Combined pressure/breath-in discomfort was modestly lower (−2.2 pp; $p = 0.012$).

Conclusion: These large-scale real-world analyses show that individualizing comfort settings from the start of PAP therapy, aligning with ML-derived recommendations, is associated with higher PAP usage and better early therapy experience without compromising safety, supporting personalized PAP comfort settings at scale.

Support (if any): Funded by Resmed.

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1263

VALIDATION OF A NOVEL SNORING DETECTION MOBILE APPLICATION AGAINST A COMMERCIALLY AVAILABLE SNORING APPLICATION

Kari Lambing¹, Md Mizanur Rahman², Md Mafijul Bhuiyan², Rami Al Metwaly³, Antonella Conflitti¹, Sat Sharma¹

¹Windsor Sleep Disorders Clinic, ²Devdec.ca, ³Delta Sleep

Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder and has a significant public health burden. Snoring is highly prevalent in OSA and is frequently used as a screening criterion before formal assessment. Research has shown that patients generally lack insight into the presence and severity of their own snoring. A phone-based application could allow for the identification of snoring in the community to highlight individuals at risk of OSA. This study aims to validate the performance of a novel AI-based snoring detection application against a commercially available snoring application.

Methods: Participants (n=76, females=32, Mage= 46.71 years, SD=13.83) were selected from patients receiving a diagnostic sleep study at the Windsor Sleep Disorders Center. During the study, participants had simultaneous recordings of the application being tested, Sleep Gofer (SG), and an already available snoring application, SnoreLab (SL). The proprietary composite scores from each application, based on scoring frequency and intensity, included Ideal Sleep (SG: high values= low snoring) and SnoreScore (SL: high values= high snoring). Correlations were used to assess the relationship between the rankings of snoring severity based on these composite scores, and between the raw composite scores of the two applications.

Results: The mean Ideal Sleep score was 131.47, SD=39.90, (with a range of 37 to 175), and the mean SnoreScore was 56.38, SD=44.67 (with a range of 0 to 181). These scores were negatively correlated, such that a higher Ideal Sleep Score was significantly related to a lower SnoreScore ($r = -.762$, $p < .001$). On average, the absolute difference between rankings of severity was 13.03 ranks (Median=11 ranks), and the rankings of severity based on these snoring applications were positively correlated ($r = .711$, $p < .001$).

Conclusion: The novel application, SleepGofer, demonstrated concurrent validity with SnoreLab when considering composite scores of snoring severity. Generally, the two applications showed alignment on the severity of patient snoring. These results provide initial evidence that the application under development is sensitive to different severities of snoring.

Support (if any): A grant by TRS Waterloo Sleep Institute, Canada

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1264

EXTERNAL VALIDATION OF A SOUND-BASED AI MODEL FOR SLEEP STAGING USING A U.S. CLINICAL PSG COHORT

EunSung Cho¹, Seunghun Kim¹, Dongheon Lee¹, Joonki Hong¹, Clete Kushida²

¹Asleep Inc., ²Stanford University

Introduction: Sound-based artificial intelligence (AI) models for sleep staging offer a non-contact approach to sleep monitoring. Prior studies have relied mainly on data collected from a Korean

clinical sleep center, where the patient population was predominantly Asian. While effective regionally, the geographic specificity of training data raises questions about global applicability. External validation across diverse clinical environments and scoring standards is therefore essential, and this study addresses that need by evaluating the generalizability of a sound-based sleep staging model using a U.S. clinical cohort.

Methods: Fourteen synchronized PSG audio recordings were collected at Stanford Sleep Medicine Center. During PSG acquisition, sleep sounds were simultaneously recorded on an iPhone at the bedside, and the model inferred sleep stages solely from smartphone audio. The final cohort included 14 participants (9 females, 5 males; mean age 57.5 ± 18.5 years; BMI 29.6 ± 6.1 ; range 25–78). Racial and ethnic distribution was White-Hispanic ($n=3$), White-Non-Hispanic ($n=9$), Other-Hispanic ($n=1$), and Asian ($n=1$). Epoch-by-epoch accuracy and macro F1 were calculated to assess performance on this external dataset.

Results: The model was trained initially on 2,973 nights of synchronized PSG-audio data from a Korean clinical sleep center (SNUBH) and achieved an accuracy of 80.9% and macro F1 0.77 on an independent test set of 802 subjects (mean age 50.5 ± 15.4 ; BMI 25.5 ± 3.6 ; male:female = 530:272; all Asian). External validation using U.S. smartphone-recorded audio demonstrated an accuracy of 77.5% and macro F1 of 0.74, indicating consistent performance despite geographic and scoring differences. Notably, the overall performance degradation was marginal, with a drop of < 0.04 in F1 score across the four sleep stages.

Conclusion: This pilot external validation confirms the generalizability of our sound-based AI model, demonstrating its potential adaptability to diverse racial and anthropometric profiles beyond its original Korea-based dataset of primarily Asian participants. The findings highlight the feasibility of smartphone-based, non-contact sleep staging and strengthen the clinical utility of scalable sound-AI sleep monitoring.

Support (if any):

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1265

AI-DRIVEN DEEP LEARNING FOR NON-INVASIVE SLEEP BIOMETRICS FROM SMART BED PRESSURE SIGNALS

Megha Rao¹, Oleksiy Tsebriy², Pavlo Chernega², Esteban Centeno³, Yehor Shcherbakov², Trevor Winger¹, Farzad Siyahjani¹, Saeed Babaeizadeh¹, Gary Garcia Molina¹

¹Sleep Number, ²GlobalLogic, ³Nanami

Introduction: Deep-learning algorithms estimated heart rate (HR), respiration rate (RR), and HRV SDNN at 1 Hz from smart beds using ballistocardiography (BCG) signals captured by a pressure sensor embedded in the bed's air chamber for non-invasive biometric monitoring.

Methods: BCG signals were sampled at 1kHz. The signals were processed with an 8 Hz low-pass filter and subsequently high-pass filtered at 0.1 Hz for RR, and at 0.5 Hz for HR and HRV. After resampling to 20 Hz, 60-second segments were normalized using z-score transformation. Supervised models were built using a convolutional neural network (CNN) backbone with three stacked blocks of either Attention Free Transformer (AFT), Transformer encoder, or LSTM applied for RR, HR and SDNN estimation respectively. The training set consisted of 127 sleep sessions, using polysomnography (PSG)-derived abdominal belts as the reference

standard for RR and electrocardiography (ECG) for HR and HRV. Validation was performed on an independent dataset of 81 unseen sessions for biometrics and 45 sessions for SDNN. Model performance was evaluated using Bland-Altman analysis and coefficient of determination (R^2) at 30-second epoch and session levels.

Results: HR estimation demonstrated close agreement with reference values, yielding epoch-level limits-of-agreement (LoA) from -9.42 to 9.51 bpm and a mean bias of 0.05 bpm [95% CI: 0.01 to 0.08]. At the session level, LoA ranged from -2.96 to 3.47 bpm, with a bias of 0.26 bpm [95% CI: -0.11 to 0.62]. R^2 values were 0.78 and 0.97 respectively. RR estimation showed epoch-level LoA from -2.70 to 2.38 breaths/min and a bias of -0.16 breaths/min [95% CI: -0.17 to -0.15], while session-level LoA ranged from -0.77 to 0.47 breaths/min with a bias of -0.15 breaths/min [95% CI: -0.22 to -0.08]. Corresponding R^2 were 0.65 and 0.96 . For SDNN, epoch-level LoA was -22.52 to 26.28 ms with a bias of 1.88 ms [95% CI: 1.75 to 2.01], and session-level LoA was -9.89 to 13.68 ms with a bias of 1.89 ms [95% CI: 0.09 to 3.70]. Corresponding R^2 were 0.66 and 0.82 .

Conclusion: This approach enables unobtrusive, continuous at-home monitoring of sleep biometrics, supporting scalable, personalized sleep assessment without the need for invasive instrumentation.

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1266

AUTOMATED SMARTPHONE-BASED DETECTION OF TIME IN BED USING A DEEP LEARNING FRAMEWORK

Luke Gahan¹, Alice Lynch¹, Nathaniel Watson², Elie Gottlieb¹

¹Sleep.ai, ²University of Washington School of Medicine, Department of Neurology

Introduction: Accurate detection of time in bed (TIB) is essential for large-scale sleep research and consumer health applications, yet most high-accuracy systems require dedicated hardware or active user engagement. We developed a zero-effort smartphone-based model that infers time-in-bed from behavioural and sensor-derived signals, requiring no user input beyond normal phone use. This work seeks to demonstrate that accurate time-in-bed estimation is achievable from passive smartphone signals alone.

Methods: A supervised sequence-to-sequence machine learning model was trained to infer nightly TIB from a PSG-validated contactless sonar smartphone application (SleepScore). Inputs consisted of behavioural and sensor-derived features aggregated into 10-minute epochs spanning full 24-hour periods. Ground-truth labels were obtained from the smartphone app: bedtime onset was defined by a user-initiated button tap signalling intent to sleep, and sleep offset by a button tap upon waking. The full dataset included smartphone-derived sequences from 1,175 training users (3,712 nights) and 392 validation users (1216 nights), with an independent test set of 421 users (1,284 nights). All splits were user-independent. The model architecture combined a convolutional neural network with a long short-term memory layer to capture local and long-range temporal patterns in daily behaviour. The model was implemented in PyTorch and trained using a boundary-aware objective function that emphasised accurate detection of sleep onset and offset transitions. Features captured behavioural indicators (e.g., activity/rest patterns) and

contextual signals (e.g., regularity of routines and personalised historical baselines), aggregated into 10-minute epochs.

Results: Model evaluation on the user-independent holdout set demonstrated strong performance in estimating TIB and detecting sleep boundary transitions. Classification performance was high, with accuracy 97.3%, precision 96.9%, recall 96.9%, F1 score 96.9%, and ROC AUC 99.5%. Timing-related metrics indicated reliable boundary detection, with a mean sleep onset error of +18.8 minutes and a mean sleep offset error of +22.0 minutes. Bias remained minimal, with sleep onset bias of +2.1 minutes and sleep offset bias of -0.1 minutes.

Conclusion: A deep learning model can accurately estimate TIB from passively collected smartphone signals, without dedicated hardware or active user input. This low-burden approach enables population-scale sleep monitoring, with potential applications in circadian rhythm research and consumer sleep opportunity assessment.

Support (if any): Sleep.ai

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1267

COMPARISON OF A NOVEL SNORING APPLICATION AGAINST IN-LABORATORY POLYSOMNOGRAPHY

Kari Lambing¹, Md Mizanur Rahman², Md Mafijul Bhuiyan², Rami Al Metwaly³, Antonella Conflitti¹, Sat Sharma¹

¹Windsor Sleep Disorders Clinic, ²Devdec.ca, ³Delta Sleep

Introduction: Snoring affects a significant portion of the adult population and can be related to sleep apnea severity. Therefore, measuring snoring intensity may be useful as a tool to predict severity. Many of the currently available applications do not attempt to measure apneas, and only measure snoring, which is only a symptom of OSA. Additionally, the commercial apps have variable strengths and weaknesses for identifying snoring and apneas. The current study aimed to assess a new snoring app, SleepGofer, by comparing snoring and apneas against polysomnography and determining whether the application snoring metrics are predictive of the in-laboratory AHIPSG.

Methods: Participants (n=74, females=32, Mage= 46.71 years, SD=13.83) were receiving a diagnostic sleep study at the Windsor Sleep Disorders Center. During the PSG, participants also had recordings from SleepGofer. The in-laboratory system consisted of mainly Cadwell sleep systems, using a snore sensor placed on the neck. A composite score measuring snoring severity and estimating apneas was calculated from the application (Ideal SleepSG). Correlations were used to assess the relationship between snoring metrics from the app and PSG. As well, ROC analyses were used to determine the sensitivity and specificity of the application composite score in predicting presence of moderate and severe AHI (AHI>15).

Results: Ideal SleepSG was negatively associated with the snoring indexPSG ($r = -.408, p < .001$) and with the AHIPSG ($r = -.567, p < .001$). AHISG was significantly associated with AHIPSG, ($r = .610, p < .001$), although AHISG ($M = 4.32, SE = .830$) underestimated events compared to AHIPSG ($M = 18.02, SE = 2.00; F(1,75) = 74.47, p < .001$). Using Ideal SleepSG to predict presence of moderate and severe OSA, an ROC analysis demonstrated acceptable discriminatory ability, with an AUC of .760 (95% CI: .651-.869). At a threshold value of 140.5 for Ideal SleepSG, (Youden's index=.432), the model achieved 75.8% sensitivity and 67.4% specificity. With

a prevalence of 43.4% of the sample with moderate or severe AHIPSG, the PPV was 64.1% for this cut-off score, with a NPV of 78.4%.

Conclusion: The novel application, SleepGofer, demonstrated utility as a screening tool for the general population and for identifying individuals at risk for moderate and severe OSA based on snoring intensity.

Support (if any): TRS Waterloo Sleep Institute, Canada

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1268

COMPARISON OF TWO WEARABLE LIGHT SENSORS FOR MEASURING FREE-LIVING AMBIENT LIGHT

Asuka Ishihara, Robert Brychta, Samuel LaMunion, Suzanne McGehee, Magaly Donayre, Olivia Jordan, Kyndall Davis, Gabriel Sanchez, Lindsey Smith, Sheidy Rios-Vasquez, Stephanie Chung, Amber Courville, Kong Chen
National Institute of Diabetes and Digestive and Kidney Diseases

Introduction: Wearable sensors are increasingly used to collect personalized light exposure measurements in studies related to sleep and circadian rhythm, however little is known about their comparative validity. Recently, we showed that four commonly used wearable light sensors drastically differed in detectable range, accuracy, and variability for laboratory-measured photopic and melanopic illuminance. Here, we compared free-living light measurements for the two sensors with the most divergent lab-based performance.

Methods: As part of an ongoing clinical trial (NCT05398783), we measured free-living light exposure using Condor ActLumus and ActiGraph wGT3X-BT devices in 31 individuals (22F/9M; 36.5±15.9 yrs). Sensors were concurrently worn on the non-dominant wrist for a week, throughout the day, with randomized proximal and distal placement. The data was processed at 60s intervals, and non-wear time was detected using a modified Troiano's method based on acceleration. Only periods of simultaneous wear on days with a minimum of 10h were analyzed.

Results: The mean daily light exposure per participant was strongly correlated between ActiGraph and Condor devices ($R = 0.91, p < 0.001$). However, the output of the ActiGraph was significantly less than that of the Condor (77.8 ± 67.5 vs 483.0 ± 456.0 lux, respectively, $p < 0.001$). The largest discrepancy between the two devices was observed in their respective detection of light intensities below 100 lux. ActiGraph recorded significantly greater wear time per day spent at 0 lux than Condor ($88.4 \pm 6.9\%$ vs $42.1 \pm 15.0\%$, $p < 0.001$). On the contrary, ActiGraph recorded a significantly lower percentage of wear time in light intensities between 1 and 100 lux than Condor ($4.7 \pm 2.8\%$ vs $39.9 \pm 13.0\%$, $p < 0.001$). Time spent in bands above 100 lux were also significantly greater for Condor ($p < 0.001$), but discrepancies in wear time between devices were $< 10\%$.

Conclusion: The large observed differences in free-living light measurements were likely due to the inter-device discrepancies in detection limits and accuracy shown in our laboratory tests. These results demonstrate that assessing sensor performance is important to accurately interpret free-living light exposure measurements across studies using different sensors. We will further investigate how such differences may impact the determination of sleep timing and duration.

Support (if any):

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1269

CONTINUOUS HOME MONITORING OF CPAP THERAPY USING A SOUND-BASED AI APNEA TRACKING DEVICE

Sungjin Heo¹, Sungeun Moon¹, Sujin Lee¹, Dongheon Lee¹, Joonki Hong¹, Yoo-Sam Chung², Hyun Jik Kim³, Jeong-Whun Kim⁴
¹Asleep Inc., ²Asan Medical Center, ³Seoul National University College of Medicine, ⁴Seoul National University Bundang Hospital

Introduction: Continuous positive airway pressure (CPAP) is the standard treatment for obstructive sleep apnea (OSA). Still, real-world adherence is frequently insufficient, and CPAP device data capture only the treated portion of sleep. As a result, untreated OSA during mask removal is often missed. ApnoTrack is a Class II smartphone-based device that uses AI analysis of breathing sounds to detect apneas and hypopneas across the entire sleep period. This study examined whether ApnoTrack can accurately assess nightly apnea-hypopnea index (AHI) in CPAP users and identify untreated OSA across different levels of adherence.

Methods: A prospective observational study was conducted in 45 adults newly prescribed CPAP therapy (BMI 27.0, baseline AHI 36.9, age 44.5; all male). Of these, 26 participants completed simultaneous monitoring with their CPAP device and ApnoTrack, yielding 560 nights. To evaluate AHI discrepancies arising when CPAP is removed during sleep, nights were categorized according to how much CPAP usage time was shorter than sleep duration estimated by ApnoTrack (ApnoTrack time minus CPAP time): full-use (≤ 5 mins), intermediate-use (5-30 mins), and partial-use (> 30 mins). For each category, AHI values measured by the two devices were compared.

Results: Of all recorded nights, 287, 128, and 145 nights were classified as full-use, intermediate-use, and partial-use, respectively. On full-use nights, ApnoTrack AHI closely matched CPAP-reported values, with a mean difference of 0.22 events/hour (2.76 ± 4.08 vs. 2.54 ± 2.01 ; $p=0.24$). On intermediate-use nights, the difference increased to 3.78 events/hour (7.66 ± 5.54 vs. 3.88 ± 3.40 ; $p < 0.001$). On partial-use nights, ApnoTrack reported a substantially higher whole-night AHI, with a mean difference of 10.26 events/hour (13.53 ± 6.62 vs. 3.27 ± 2.48 ; $p < 0.001$).

Conclusion: Across the three categories, ApnoTrack-measured AHI rose progressively ($2.76 \rightarrow 7.66 \rightarrow 13.53$), whereas CPAP-reported AHI remained relatively stable ($2.54 \rightarrow 3.88 \rightarrow 3.27$). These findings indicate that ApnoTrack accurately measures apnea severity on nights of full CPAP adherence and identifies untreated OSA on nights of partial CPAP use, providing clinically meaningful information that CPAP data alone cannot provide. Continuous sound-based monitoring with ApnoTrack enables more comprehensive assessment of CPAP treatment use and whole-night OSA burden.

Support (if any):

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1270

EFFECTS OF HEAT AND HUMIDITY ON SLEEP PARAMETERS: INSIGHTS FROM 24.2 MILLION NIGHTS USING AN UNDER-MATTRESS SLEEP MONITORING DEVICE

Jatuporn Wanchaitanawong¹, Burleigh Charlton², Andrew Cotton-Clay², Venkat Easwar², Arthur Kinsolving², Yue Leng³, Jenny Zitser⁴, Clete Kushida⁵

¹Phayao Ram hospital, ²Fullpower Technologies, Inc., ³University of California, San Francisco, ⁴Movement and Sleep Disorders Unit, Neurology Department, Tel Aviv Sourasky Medical Center, Israel, ⁵Stanford University

Introduction: Environmental conditions, particularly temperature and humidity, are increasingly recognized as modifiable factors influencing sleep. Amid global warming, rising temperatures and greater humidity variability make understanding these environmental effects even more essential. Leveraging under-mattress sensors, large-scale real-world datasets now allow precise quantification of night-to-night environmental perturbations and their impact on sleep parameters.

Methods: We analyzed the relationship between bedroom environment and sleep parameters using a large longitudinal dataset comprising approximately 24.2 million nights from 201,619 users (45.2% female, 53.8% male, 1.0% unspecified gender, with mean (SD) age of 49.7(13.0) years) collected across three summer-centered periods (2023–2025) recorded with validated commercial under-mattress sleep-monitoring devices (Fullpower Technologies). The impacts of within-participant indoor temperature and relative humidity (RH) changes on sleep stage composition and on AHI were modeled via mixed-effects models.

Results: Warmer-than-usual nights were associated with consistent shifts in sleep-stage composition. Each $+1^\circ\text{C}$ increase was linked to a decrease in REM proportion by 0.44% (99.9% CI -0.46 to -0.42) and Deep Sleep proportion by 0.12% (99.9% CI -0.15 to -0.08), with a concomitant increase in Light proportion by 0.16% (99.9% CI $+0.16$ to $+0.17$). Humidity anomalies showed similar but smaller effects. Each +1 percentage-point RH increase reduced REM proportion by 0.064% (99.9% CI -0.070 to -0.058) and Deep Sleep proportion by 0.081% (99.9% CI -0.091 to -0.072), while increasing Light Sleep proportion by 0.035% (99.9% CI $+0.033$ to $+0.038$). Additionally, AHI increased 0.88% (99.9% CI $[0.82\%, 0.94\%]$) per $+1^\circ\text{C}$ increase and 0.29% (99.9% CI $[0.27\%, 0.31\%]$) per +1 percentage-point RH.

Conclusion: In this population-scale real-world study, warmer and more humid nights shifted sleep toward lighter stages and increased respiratory burden. These findings highlight the physiologic sensitivity of sleep to small environmental changes and the importance of microenvironment monitoring in sleep research and clinical care. As global warming accelerates such fluctuations, these effects are likely to become increasingly relevant for population sleep health.

Support (if any):

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1271

EVALUATION OF A NOVEL IN-EAR WEARABLE FOR HRV AND MICROAROUSAL DETECTION DURING SLEEP

Selina Zhu¹, Nick Calafat¹, Daniel Lee¹, Fiona Baker², Milena Quinci¹, Alan Taitz³

¹Lumia Health, ²SRI International, ³SRI

Introduction: Heart rate variability (HRV) is a key biomarker of autonomic function and arousal during sleep. Traditional methods for HRV analysis rely on research-grade electrocardiography (ECG) or finger-based photoplethysmography (PPG), both of which pose limitations in comfort and signal stability during overnight

wear. We present preliminary Phase I results from a novel in-ear wearable (Lumia) designed to enable continuous HRV tracking and microarousal detection during sleep.

Methods: Lumia is a lightweight, in-ear PPG sensor with integrated memory and onboard feature extraction. HR and HRV metrics were derived from Lumia's PPG signal and benchmarked against research-grade ECG and finger PPG during overnight recordings. Separately, a microarousal detection algorithm was developed using research-grade finger PPG from 10 full-night polysomnography (PSG) datasets from unique subjects. A random forest model was trained using leave-one-out cross-validation and focused on changes in HR, RR interval variability, and pulse amplitude in pre- and post-arousal windows.

Results: Compared to research-grade finger PPG (MAE = 6.94; RMSE = 24.63 ms), Lumia (MAE = 4.25; RMSE = 18.55 ms) demonstrated significantly lower error in HRV estimation. Notably, the wearable's resting-state HRV data during sleep was highly correlated with ECG-derived values, supporting feasibility for overnight use. In parallel, the initial microarousal model achieved an average cross-validated AUC of 0.90 across 10 PSG subjects. Predicted microarousal counts per subject showed strong correlation with ground truth ($r = 0.902$). Key predictive features included HR standard deviation and RR interval variability.

Conclusion: These findings support the technical feasibility of the Lumia wearable for high-fidelity HR and HRV monitoring during sleep and offer promising early evidence for microarousal detection using machine learning. The combination of stable in-ear PPG signals and embedded analytics highlights Lumia's potential as a fieldable, real-time sleep monitoring solution. The strong correlation between predicted and actual microarousal counts suggests good generalizability. Lumia's superior HRV accuracy over finger PPG indicates that model performance may improve further with in-ear data. Future work will focus on training the microarousal detection algorithm using labeled in-ear PPG data to further enhance performance and clinical utility.

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1272

INTEGRATING WEARABLE-DERIVED SLEEP BIOMARKERS INTO HL7 FHIR ELECTRONIC HEALTH RECORDS

Geovane Viana¹, Cristina Salles¹, André Toffanello²

¹Escola Bahiana de Medicina e Saúde Pública, ²Core Consulting

Introduction: Wearable devices allow continuous monitoring of physiological sleep variables, but these data remain largely isolated from clinical systems due to the lack of standardized interoperability. This limits diagnostic value, longitudinal follow-up, and their use in clinical decision support. This study proposes and evaluates a model for converting wearable-derived sleep biomarkers into structured HL7 FHIR resources within an electronic health record.

Methods: A middleware system was developed to receive raw biometric data in JSON format from a wrist-worn wearable device (Samsung Watch). The pipeline included preprocessing of heart rate, oxygen saturation, heart rate variability, movement, total

sleep time, estimated sleep stages, habitual bedtime and wake time, sleep onset latency, and total sleep time with oxygen saturation below 90 percent. Semantic mapping was performed using LOINC and SNOMED CT, followed by syntactic conversion into HL7 FHIR resources such as Observation, Device, Patient, and SleepStudy. Validation occurred in a FHIR server connected to an electronic health record. Adults undergoing outpatient sleep evaluation completed seven days of monitoring. Outcomes included data ingestion completeness, FHIR conformity, and feasibility of clinical visualization.

Results: Preliminary tests demonstrated successful ingestion of most transmitted data, with an average processing latency of a few seconds per dataset. All observations passed structural FHIR validation, and terminology mapping was consistent for core sleep variables. Key parameters, including total sleep time, nocturnal heart rate, oxygen saturation metrics, sleep onset latency, habitual sleep timing, and total sleep time below 90 percent saturation, were displayed in structured longitudinal format within the electronic record. No conflicts or security issues were detected. Clinicians reported clear interpretability of the integrated data.

Conclusion: The model proved feasible for converting wearable-derived sleep biomarkers into structured HL7 FHIR data suitable for clinical workflows. This approach may support remote monitoring, enhance diagnostic evaluation, and provide a foundation for future predictive algorithms using standardized longitudinal sleep data. Continued development will expand the dataset, integrate additional devices, and assess clinical impact.

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1273

MENSTRUAL TEMPERATURE RHYTHMICITY AND ITS ASSOCIATION WITH SLEEP DURATION, STABILITY, AND EFFICIENCY IN A LARGE WEARABLE COHORT

Orsolya Kiss, Ketan Patel, Christine Curry, Massimiliano de Zambotti Ouraring Inc.

Introduction: Basal body temperature has long been used for ovulation detection and fertility awareness. With wearable sensors, nightly distal skin temperature can be captured continuously, offering an opportunity to characterize the strength and consistency of these temperature rhythms in daily life. Because physiological systems often interact through shared autonomic, metabolic, and circadian pathways, examining how menstrual temperature oscillations relate to sleep may provide insight into the degree of coupling between reproductive and nightly restorative processes. This study examined whether the strength and stability of menstrual temperature oscillations are associated with sleep duration, sleep efficiency, and night-to-night sleep variability in a large, real-world sample of Oura Ring users.

Methods: We analyzed longitudinal data from 10,434 Oura Ring users ages 21–55 who logged at least four consecutive menstrual cycles. Nighttime distal skin temperature was modeled using individualized sinusoidal fits based on each user's cycle length.

Per-cycle amplitude and model fit were combined into a cycle coherence index reflecting oscillation strength and model fit quality. We tested associations between cycle coherence and sleep outcomes (duration, efficiency, night to night variability in sleep duration - coefficient of variation), adjusting for age, body mass index (BMI), cycle length, cycle length regularity, and hormone use using Generalized Mixed Effect Models.

Results: The highest overnight temperature exhibited a pronounced and well-defined oscillatory pattern across the menstrual cycle. Cycle coherence was related to all sleep outcomes, with lower coherence linked to shorter sleep ($\chi^2=154.2$; $p<.001$), lower sleep efficiency ($\chi^2=681.7$; $p<.001$), and greater night-to-night variability ($\chi^2=1001.3$; $p<.001$). Lower coherence was more common in individuals with irregular cycles, atypical cycle lengths, higher BMI, and older age—groups that also showed shorter or less efficient sleep.

Conclusion: Stronger menstrual temperature rhythmicity was associated with longer, more efficient, and more stable sleep. These findings suggest that temperature-based cycle oscillation patterns, reflected in cycle coherence appear to reflect broader patterns of physiological organization that extend to nightly restorative processes. These findings highlight that wearable-derived temperature signals could help characterize menstrual-sleep interactions and identify individuals with disrupted rhythms.

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1274

PRACTICAL CONSIDERATIONS FOR USING PULSE OXIMETRY DATA FROM SMARTWATCHES TO PROMOTE SELF-MANAGEMENT OF OSA

Aaron Thomas¹, Selene Mak², Garrett Ash³, Erin Der-Mcleod¹, Jason Ereso⁴, Saadia Naeem⁴, Jinhui Liu⁵, Sara Ghadimi⁶, Tue Te⁷, Michelle Zeidler⁴, Li-Jung Liang⁵, Constance Fung⁸

¹VA Greater Los Angeles Healthcare System, ²Center for the Study of Healthcare Innovation, Implementation and Policy, VA Greater Los Angeles Healthcare System, ³Yale University, ⁴Department of Medicine, David Geffen School of Medicine at the University of California, ⁵Department of Medicine Statistics Core, David Geffen School of Medicine at the University of California, Los Angeles, ⁶University of California Davis School of Medicine, ⁷UCLA, ⁸Geriatric Research, Education and Clinical Center, VA Greater Los Angeles Healthcare System

Introduction: Consumer-grade smartwatches with pulse oximetry are increasingly available. We previously demonstrated in a pilot randomized trial (NCT06039865) that weekly, patient-facing reports summarizing nightly minute-to-minute pulse oximetry (SpO2) data collected from smartwatches improved PAP usage in patients with OSA who were non-adherent to PAP therapy. In this study, we further analyzed the trial's pulse oximetry data to describe completeness of SpO2 data and patterns of desaturations to inform the feasibility of the intervention and future applications of this novel use of smartwatches.

Methods: Participants were instructed to wear a smartwatch (Fitbit Charge 5) for 28 consecutive days. Smartwatch data were sent to a database that the study team downloaded weekly. The

number of days (out of 28) with available SpO2 data, total minutes SpO2 collected per sleep period, and minutes of SpO2 < 88% were analyzed. Possible explanations for data loss were enumerated based on the research team's troubleshooting efforts during the intervention.

Results: Data from 49 participants (mean age 47.8 years; 12% female) were available. The number of days with available SpO2 data per participant ranged from 11 to 28 days out of the 28-day study period. The average daily total minutes of SpO2 collected per sleep period across participants ranged from 1.6 to 6.9 hours (96 to 416 minutes), with night-to-night variability within each participant as well. Explanations for incomplete data included: forgetting to wear the smartwatch, obstructions to the smartwatch SpO2 sensing (e.g., tattoos), and participants not meeting the smartwatch's internal requirements for sleep to begin the minute-by-minute SpO2 sampling. 26 (53%) participants had at least 1 sleep period with SpO2 < 88% for ≥ 10 minutes; % sleep periods with SpO2 < 88% for ≥ 10 minutes mean was 8.6% (SD 6.5; min 3.7%, max 30.4%).

Conclusion: Minute-to-minute SpO2 data collected by smartwatches among patients nonadherent to PAP therapy show a wide range of values. Determining whether there is a minimum amount and appropriately distributed coverage of SpO2 data needed for patient facing SpO2 reports to significantly alter PAP adherence would provide clinicians a way to leverage data provided by smartwatches.

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1275

SEAMLESS WEIGHT CHANGE TRACKING WITH SMART BED PRESSURE SIGNALS AND MACHINE LEARNING

Megha Rao¹, Yehor Shcherbakov², Pavlo Chernega², Erwin Veneros³, Gary Garcia Molina¹

¹Sleep Number, ²GlobalLogic, ³Nanami

Introduction: Accurate weight fluctuation monitoring is critical for managing cardiometabolic health, yet reliance on manual scales undermines adherence and scalability. Smart bed technology eliminates this barrier by passively tracking weight from overnight pressure signals, requiring minimal user effort. This study develops an Extreme Gradient Boosting (XGBoost)-based framework to detect clinically relevant weight changes ($\geq 2.5\%$) and longitudinal trends, enabling seamless integration of weight monitoring into daily life while maintaining the accuracy necessary for meaningful health surveillance.

Methods: Six participants collected smart bed pressure data over 2 weeks, with daily reference weights from a weighing scale. Smart bed pressure signals were downsampled from 1 kHz to 1 Hz to reduce noise. Data were segmented into in-bed and baseline periods, and signal stability was assessed using entropy-based metrics on 30-second windows. Stable windows (low entropy) were retained, and median pressure values were extracted for analysis. Feature engineering utilized two data sources: raw pressure signals and high-quality in-bed readings from the first 60 seconds post-entry. Nightly summaries (mean and median) were standardized by subtracting baseline pressure. Relative changes

were expressed as percentages. The two most predictive features were standardized nightly means computed with and without quality filtering. Temporal trends were derived by calculating weekly weight-change slopes over seven-night smoothened windows. Features were rescaled using min-max normalization before XGBoost training. The optimal model used a generalized linear booster with 40 estimators, a maximum depth of 5, learning rate of 0.5, and ridge regularization of 0.01. Subject-level leave-one-out cross-validation evaluated model performance using coefficient of determination (R^2), Bland-Altman limits of agreement (LoA) for weight change, and confusion matrix metrics for trend classification at a 2.5% threshold.

Results: Weight-change estimation showed strong agreement with reference measurements ($R^2 = 0.91$; LoA ± 0.12 lbs./night; mean bias 0 [95% CI: ± 0.02]). Trend classification achieved 83% accuracy with sensitivity 0.82, specificity 0.85, precision 0.88, and Cohen's kappa 0.66, demonstrating robust detection of weight trajectories.

Conclusion: This approach enables seamless at-home monitoring of weight fluctuations and longitudinal trends, supporting scalable personalized health tracking with minimal user burden. Limitations include small sample size and associated epistemic uncertainty. Larger studies are needed to confirm generalizability.

Support (if any):

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1276

THE EFFECTS OF A DIGITAL SLEEP MANAGEMENT APP WITH HUMAN SUPPORT ON DIGITAL LITERACY AND SLEEP HEALTH IN OLDER ADULTS

W.O.N.C.H.U.L. SHIN¹, Seonmin Yoon², Si Woo Ban³

¹KyungHee University Hospital at Gangdong, ²Clean Su Hospital, ³KyungHee University

Introduction: As the population ages, sleep disturbances and the digital divide have become significant challenges for older adults. This study aims to empirically examine the effects of a digital healthcare-based sleep management application on digital literacy, frailty, sleep quality, and insomnia severity among community-dwelling older adults aged 65 and over.

Methods: A nonequivalent control group pretest-posttest design was employed. A total of 53 participants recruited from community welfare facilities were assigned to three groups: Experimental Group 1 ($n=16$) used the sleep management app ('Honey Sleep Doctor') independently; Experimental Group 2 ($n=20$) used the same app with daily support from a senior care manager; and a Control Group ($n=17$) received no intervention. The intervention lasted for two weeks. Key measures included the Functional Assessment of Comfort Employing Technology Scale (FACETS) for digital literacy, the Short Physical Performance Battery (SPPB) for frailty, the Korean Version of the Pittsburgh Sleep Quality Index (PSQI-K) for sleep quality, and the Insomnia Severity Index (ISI) for insomnia severity. Data were analyzed using repeated measures ANOVA, one-way ANOVA, and t-tests.

Results: Repeated measures ANOVA revealed significant time-by-group interaction effects for digital literacy ($F=4.683$, $p=.014$) and frailty ($F=5.255$, $p=.008$). Within-group analyses showed that

Experimental Group 2 (App + Senior Care Manager) achieved statistically significant improvements in digital literacy ($t=-7.167$, $p<.001$), sleep quality ($t=2.164$, $p=.043$), and insomnia severity ($t=2.154$, $p=.044$) compared to baseline¹. In contrast, Experimental Group 1 (App only) showed significant improvement only in frailty ($t=-6.536$, $p<.001$), with no significant changes in digital literacy or sleep-related variables². One-way ANOVA on post-intervention scores confirmed significant group differences in digital literacy ($F=5.415$, $p<.01$), sleep quality ($F=3.244$, $p<.05$), and insomnia severity ($F=4.875$, $p<.05$), with Experimental Group 2 demonstrating superior outcomes compared to the other groups.

Conclusion: The findings suggest that the effectiveness of digital healthcare for older adults relies not only on technology but also on human support. While the app-only approach showed limited impact, combining it with a senior care manager significantly improved digital literacy and sleep health. This underscores the necessity of integrating human-touch services to bridge the digital divide and enhance health outcomes for the elderly.

Support (if any):

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1277

#MOUTHTAPE: A CONTENT ANALYSIS OF A SOCIAL MEDIA CRAZE

Mst Begum¹, Stuart Quan², Saumya Sawant³, Maryam Al Qaderi¹, Rebecca Robbins⁴

¹Harvard College, ²Harvard Medical School, ³Northeastern University, ⁴Division of Sleep Medicine, Harvard Medical School

Introduction: 90% of Americans primarily obtain health information from online sources, such as social media (e.g., TikTok). Mouth taping has emerged as a social media trend, yet the scientific evidence for or against mouth taping is nascent. We conduct a content analysis of TikTok videos on mouth taping.

Methods: We conducted two searches for "mouth tape" on a new TikTok account created in August 2024 from a smartphone in Boston, Massachusetts. We downloaded the first 20 videos that appeared on the front page without any sorting parameters. Then, we sorted the results to identify the 20 most popular videos by likes. Two videos in each sample were deleted from TikTok, leaving 18 videos in each sample. We obtained the number of likes, comments, saves, and shares for each video. In addition, two independent coders coded the level of misinformation, the video creator type (e.g., content creator, health professional), and commercial bias. Descriptive statistics were computed to ascertain engagement for the videos in each dataset (e.g., likes, comments) and the quality of content (theme, misinformation, and commercial bias).

Results: In the first sample ($n=18$), 75% of videos were produced by content creators and 25% by medical experts; videos averaged 142,424.1 likes, 342.59 comments, and 4,845.61 shares. The most common content theme was mouth taping as part of a beauty routine. 38.9% of the videos featured misinformation, and 5.6% featured commercial bias. In the second sample ($n=18$), 100% of videos were produced by content creators; videos averaged 343,444.6 likes, 1,022.91 comments, and 41,221.30 shares. The most common content theme was mouth taping as part of a

beauty routine; 16.6% of videos featured misinformation, and 5.6% commercial bias.

Conclusion: This content analysis of TikTok videos about mouth taping revealed that videos are widely viewed. Although these videos did not typically contain misinformation or commercial bias, the videos depicted mouth taping as part of a daily beauty routine, potentially normalizing this practice that does not yet have a strong evidence base.

Support (if any):

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1278

ASSOCIATIONS BETWEEN SELF-REPORTED DAILY LIFESTYLE BEHAVIORS AND OBJECTIVE SLEEP PARAMETERS IN A LARGE, REAL-WORLD SAMPLE

Ayşe Kamacı¹, Sasha Milton¹, Hannah Yang¹, Andrew Cotton-Clay², Susan Baron², Laura Fava², Venkat Easwar², Arthur Kinsolving², Philippe Kahn², Jenny Zitser³, Clete Kushida⁴, Yue Leng¹

¹University of California, San Francisco, ²Fullpower Technologies, Inc., ³Movement and Sleep Disorders Unit, Neurology Department, Tel Aviv Sourasky Medical Center, Israel, ⁴Stanford University

Introduction: Lifestyle behaviors may influence sleep architecture and quality. The extent to which sleep parameters are impacted by day-to-day behavioral variations remains poorly understood in large, real-world populations.

Methods: Sleep was monitored from 11/15/2023-11/14/2025 using a commercially available under-mattress device (Sleeptracker-AI Monitor, Fullpower Technologies Inc., California, USA) that continuously records sleep via piezo-electric sensors. Sleep metrics included wake after sleep onset (WASO), total sleep time (TST), REM and deep sleep percentages, breathing anomaly index (BAI), and arousal index (AI). Each morning, participants self-reported exercise, alcohol consumption, eating, sleep-aid use, and TV or mobile device use. For each question, only participants who provided at least two distinct responses across multiple nights were included to enable within-participant comparisons. Mixed linear models with participant as a random effect were used to derive percentage changes in sleep parameters associated with self-reported behaviors.

Results: Analyses varied in sample size (largest [exercise]: 85,706 participants, 2,318,639 nights; smallest [sleep-aid use]: 2,440 participants, 88,966 nights; mean across all analyses: 37,304.4 participants, 997,703.6 nights). Across all participants (48.2% female), the mean age was 52.9±14.4 years. All reported effects were significant ($p < 0.001$). On nights following exercise (vs. no exercise), participants had reduced WASO (some: -1.60%; vigorous: -1.63%), reduced BAI (some: -0.99%; vigorous: -2.44%), increased deep sleep percentage (some: +0.50%; vigorous: +0.63%), and reduced REM sleep percentage with vigorous exercise only (-0.67%). Alcohol use (vs. non-use) was associated with increased WASO (+3.97%), reduced REM sleep percentage (-1.71%), increased deep sleep percentage (+1.38%), reduced BAI (-2.51%), and reduced AI (-1.26%). Eating within 2 hours of bedtime (vs. not eating) increased deep sleep percentage (snack: +0.50%; meal: +1.45%), reduced BAI (snack: -1.07%; meal: -1.01%) and TST (snack: -0.51%; meal:

-0.46%), and had opposing effects on WASO (snack: -0.83%; meal: +0.72%). Compared to non-use, sleep-aid use reduced WASO (-4.01%), reduced REM sleep percentage (-1.33%), and increased TST (+2.67%). TV or mobile device use (vs. non-use) was associated with decreased WASO (-1.68%) and TST (-1.10%).

Conclusion: Lifestyle behaviors were associated with within-person differences in objective sleep metrics. Non-invasive sleep-tracking technologies offer a powerful way to characterize how lifestyle choices influence sleep health.

Support (if any): Fullpower Technologies.

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1279

COMPARATIVE EVALUATION OF CONSUMER SLEEP TRACKERS IN REAL-WORLD HOME ENVIRONMENTS USING HOME POLYSOMNOGRAPHY

Seunghun Kim¹, EunSung Cho¹, Sujin Lee¹, Sungjin Heo¹, Dongheon Lee¹, Joonki Hong¹, Clete Kushida², In-Young Yoon³

¹Asleep Inc., ²Stanford University, ³Seoul National University Bundang Hospital

Introduction: Consumer sleep trackers (CSTs) are increasingly used for daily sleep monitoring, yet their performance in real-world home environments remains insufficiently characterized. Most existing validations have been conducted in controlled laboratory settings, which may not fully reflect everyday sleeping conditions. This study aimed to evaluate the accuracy of five common CSTs, including two smartwatch-based, two ring-based, and one airable device, by directly comparing their measurements against simultaneously collected home polysomnography (PSG) in participants' habitual sleep environments.

Methods: Eight adults participated, each undergoing overnight monitoring in their typical home setting while minimizing external noise and ensuring single-sleeper conditions. Five CSTs (Apple Watch, Galaxy Watch, Galaxy Ring, Oura Ring, and Sleep Routine) were worn concurrently along with a type 2 home PSG device (Embletta MPR PG & ST+Proxy). Sleep stages were evaluated using epoch-by-epoch comparison across 9,441 epochs (78.7 hours) with four-stage classification (Wake, Light, Deep, REM). Sleep onset and wake time accuracy were also assessed using mean bias and mean absolute error (MAE).

Results: For 4-stage sleep classification, Sleep Routine demonstrated the highest macro F1 score (0.83), followed by Apple Watch (0.79), while the lowest-performing device scored 0.71. Accuracy showed a similar pattern, with Sleep Routine at 86.5%, Apple Watch at 84.0%, and the lowest device at 75.1%. For sleep onset time, Galaxy Watch exhibited the smallest mean bias (-0.2 min) but with larger variability, whereas Sleep Routine and Apple Watch achieved the lowest MAE (2.2 min). For wake time estimation, Sleep Routine achieved near-zero mean bias (< 0.1 min) and the lowest MAE (1.0 min).

Conclusion: In real-world home environments, all CSTs demonstrated generally high performance, with every device achieving a macro F1 score above 0.70. These findings indicate that CSTs can achieve reliable performance under naturalistic yet controlled home conditions, while also showing performance differences across device types and sensing modalities. Larger and more

diverse studies will further enhance the generalizability of these results.

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1280

INFLUENCE OF COMPETITION ON NIGHTTIME SLEEP AND HEART RATE METRICS: A LONGITUDINAL STUDY IN NCAA DIVISION 1 WOMEN'S VOLLEYBALL ATHLETES

Tianqi Zhai¹, Jesse Cook², Jessica Love¹, Jennifer Sanfilippo¹, David Plante³, Andrew Watson⁴

¹University of Wisconsin- Madison, ²University of Wisconsin-Madison, School of Medicine and Public Health, Department of Psychiatry, ³Department of Psychiatry, University of Wisconsin, Madison, ⁴University of Wisconsin School of Medicine and Public Health

Introduction: The physical, psychological, and logistical aspects of competition can negatively affect the sleep health of athletes. Despite a growing body of research in this area, women collegiate athletes are underrepresented and understudied. This investigation was designed to examine how competition affects sleep (duration, continuity, and timing) in National Collegiate Athletic Association (NCAA) Division 1 women's volleyball athletes, leveraging objective data collected longitudinally across a calendar season.

Methods: The Oura Ring measured nighttime sleep duration, continuity (sleep onset latency and efficiency), and timing (bedtime and waketime) continuously across a competitive season in Division 1 women's volleyball athletes. Sleep episodes were classified based on competition status (no match [NM], night before [NB], or night following [NF]). Linear mixed-effects models examined differences in sleep between NM, NB, and NF, with post-hoc pairwise comparisons conducted when appropriate. Secondary analyses explored the influence of match timing (before 17:00 vs. $\geq$ 17:00) and location (home vs. away) on NB and NF sleep.

Results: 656 nights of sleep from 10 athletes were analyzed, including data collected over 22 matches. Significant variance was observed across NM, NB, and NF conditions for sleep duration ($F(2,644.7) = 22.5$, $p < 0.0001$), bedtime ($F(2,644.3) = 69.7$, $p < 0.0001$), and waketime ($F(2,644.5) = 24.7$, $p < 0.0001$), but not for continuity variables. Athletes had significantly shorter sleep duration during NF (6.95 ± 0.15 hours), relative to NM (7.34 ± 0.13 hours, $p < 0.0001$) and NB (7.82 ± 0.15 hours, $p < 0.0001$), while sleep duration was significantly longer during NB compared to NM ($p < 0.0001$). Bedtimes and waketimes were significantly delayed during NF, relative to NM and NB, with waketimes significantly later in NB compared to NM. For match timing, significantly shorter sleep duration occurred prior to earlier matches and following later matches. For match location, significantly shorter sleep duration occurred prior to home matches and following away matches.

Conclusion: NCAA Division 1 women's volleyball athletes were vulnerable to shortened and delayed sleep following competition. Athletes showed extended sleep on the night prior to competition, perhaps reflecting an intentional prioritization and protection of sleep to enhance performance.

Support (if any): None.

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1281

SLEEPING IS BELIEVING? DISCREPANCIES BETWEEN PERCEIVED AND EEG-MEASURED SLEEP QUALITY IN HOSPITALIZED PATIENTS

Molly Hundertmark¹, Daniel Levendowski², Sullafa Kadura³

¹University of Pittsburgh, ²N/A, ³UPMC

Introduction: Sleep in the hospital is often fragmented, yet little is known about how objective and subjective sleep measures align in this setting. We compared EEG-derived objective sleep estimates with patient-reported sleep to assess differences in in-hospital sleep duration and continuity.

Methods: Adult inpatients at a tertiary hospital wore a portable sleep-staging headband, the Sleep Profiler, and completed morning sleep diaries. Participants with complete paired data were included. Diaries captured total sleep time (TST), sleep latency, number of awakenings, and wake after sleep onset. Objective sleep was derived from the Sleep Profiler and scored by a sleep technician. Correlations and mean differences were calculated to assess agreement between methods.

Results: Thirty-four participants (mean age 59 years; 47% female) completed paired wearable EEG and diaries. Participants reported an average TST of 6h24m, while EEG measured 4h04min, representing an overestimation of approximately 2h20min. Sleep latency was underestimated by an average of 39 minutes. Subjective sleep efficiency averaged at 69% versus objectively measured at 49%. Correlations were weak to modest: TST ($r=0.12$), sleep latency ($r=0.21$), and sleep efficiency ($r=0.31$).

Conclusion: This study provides novel evidence on the discrepancy between patient-reported and EEG-measured sleep in hospitalized patients. Our findings demonstrate that patients may overestimate their sleep quality while hospitalized.

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1282

ASSESSING THE EFFECT OF AN AI-BASED CHATBOT INTERVENTION ON SLEEP

Xiaoyue Liu

New York University

Introduction: Poor sleep is a significant public health concern in the U.S. Previous sleep interventions often face barriers such as high costs, limited accessibility, and low user engagement. To address these gaps, our team developed an artificial intelligence (AI)-driven chatbot powered by large language models that delivers individualized guidance on sleep promotion. This study examined the preliminary efficacy of the AI chatbot on sleep outcomes.

Methods: We conducted a two-group parallel randomized controlled trial among U.S. adults with short sleep and poor sleep quality. Participants were randomly assigned to either the intervention group (two-week engagement with a virtual sleep therapist via text messaging) or the waitlist control group (two-week wait followed by the intervention). Sleep outcomes included Fitbit-measured total sleep time (TST) and self-reported sleep

quality, insomnia severity, sleep environment, and sleep hygiene, assessed using validated instruments.

Results: This ongoing trial has enrolled 12 adults (4 control and 8 intervention) to date. The participants' mean age was 42 ± 10 years, and 42% were female. At baseline, all participants reported poor sleep quality, with an average of TST of 319 ± 47 minutes. No significant between-group differences were observed across any sleep measurements. After engaging with the AI chatbot, the intervention group showed a significant increase in TST (intervention vs. control: $+60.3$ vs. -19.5 minutes, $p = 0.004$) and a greater reduction in poor sleep hygiene behaviors (intervention vs. control: -26.8 vs. 1.3) than the control group. Both groups demonstrated significant improvements in TST (mean difference [MD]: 58.0 ± 39.6 minutes, $p < 0.001$), perceived sleep quality (MD: -4.6 ± 4.0 , $p = 0.002$), insomnia severity (MD: -7.7 ± 6.4 , $p = 0.002$), and sleep hygiene behaviors (MD: -22.3 ± 8.8 , $p < 0.001$) after the intervention.

Conclusion: The preliminary findings suggest that our AI-based chatbot may have a positive effect on sleep promotion. A fully powered sample is needed to confirm these early results. If replicated, this work highlights the promise of integrating generative AI technologies into sleep interventions.

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1283

INITIAL EVALUATION OF A VIBROACOUSTIC INTERVENTION FOR SLEEP IMPROVEMENT

Michele Okun¹, Lynnclaire Dennis², Peter McNair³

¹University of Colorado, Colorado Springs, ²N/A, ³The Mereon Legacy

Introduction: Efficient and sufficient sleep is critical to optimal well-being and longevity. A decrease in deep sleep (SWS/N3) resulting from aging, sleep disorders, or other morbidities is associated with a host of impairments in memory, clearance of the

brain's waste, and physical/mental restoration. Auditory stimulation is an emerging option seeking to increase or at least maintain production of slow oscillations recognized to their restore functions. A plethora of consumer devices are on the market claiming to improve sleep. Few of the effective options are practical for at-home use and most commercial devices have not been rigorously tested in RCT cross-over designs. The current study evaluated the Sonopeace™ solution, a novel vibroacoustic sleep intervention, on the sleep of adults with sleep difficulties

Methods: Participants (N = 45) were randomly assigned to the Sonopeace and a placebo sound condition in a $3 \times 2 \times 2$ crossover design. Protocol A: Baseline:Placebo: Sonopeace. Protocol B: Baseline:Sonopeace:Placebo. Daily sleep data came from questionnaires and the SleepScore Max device. Validated sleep questionnaires were given at the end of each study period. Initial analyses used ANOVA and paired t-tests focused on changes across the study periods.

Results: Protocol A showed no significant changes in objective sleep from Baseline to Placebo. There were improvements in %Light, %REM, and WASO from Placebo to Sonopeace (P 's $< .01$). Similar to the objective data, improvements in daytime sleepiness, symptoms of insomnia, and general sleep disturbance were noted only after the Sonopeace. For Protocol B, there were significant improvements in %Deep and WASO from baseline to Sonopeace, with additional improvements observed in %SE and %REM in Sonopeace to Placebo. The subjective measures, except daytime sleepiness, were significantly improved after Sonopeace, and all had sustained improvement during the placebo condition.

Conclusion: Preliminary analyses indicate that listening to Sonopeace is associated with measurable improvements in both objective and subjective indicators of sleep quality. While improvements in objective sleep were sustained to a lesser degree, the persistence of perceived sleep benefits suggests a meaningful psychological component. Taken together, these findings point to Sonopeace as a promising, commercially available solution for improved sleep health.

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1284

BEYOND CHILDHOOD: UNEXPLAINED HYPERCAPNIA REVEALS ADULT-ONSET CCHS

Meng-Shan Lin¹, Jenna Sapone¹, Courtney Fitch², Matthew Zheng¹, Aileen Love²

¹St. Luke's University Health Network, ²Lehigh Valley Health Network/Jefferson

Introduction: Congenital Central Hypoventilation Syndrome (CCHS) is a rare genetic disorder of autonomic respiratory control, typically diagnosed in infancy. Adult-onset presentations are exceedingly uncommon but may manifest as unexplained hypercapnia and nocturnal hypoventilation. Early recognition and genetic testing are essential for diagnosis and management.

Report of case(s): A 45-year-old woman with a history of anxiety and depression presented in January 2024 after referral from an orthopedic clinic due to hypoxia. Evaluation revealed chronic hypercapnic respiratory failure of unclear etiology. Physical examination showed normal breath sounds, while neurologic and neuromuscular assessments were notable for persistent chest wall discomfort and reduced maximal inspiratory and expiratory pressures (MIP/MEP). Pulmonary function testing demonstrated mild restriction, and chest CT was unremarkable. She required 4 L/min of supplemental oxygen for nocturnal hypoxemia and was started on BiPAP for hypercapnia. A comprehensive neuromuscular workup—including diaphragm ultrasound, fluoroscopic sniff test, EMG, and brain imaging—was normal. Serologic studies, including autoimmune, neuromuscular, and metabolic panels, were unremarkable except for elevated serum bicarbonate levels. Genetic testing revealed a PHOX2B mutation with 20/25 polyalanine repeats, establishing the diagnosis of adult-onset CCHS. She was transitioned to noninvasive ventilation with a backup rate. Genetic counseling was advised, and cardiac evaluation was recommended due to an increased risk of arrhythmias.

Conclusion: Adult-onset CCHS is extremely rare and most often associated with mild PHOX2B polyalanine expansions, typically 20/24–20/27. Diagnosis requires both a compatible clinical phenotype—chronic hypercapnia, nocturnal hypoventilation, reduced MIP/MEP—and exclusion of other pulmonary, neuromuscular, or metabolic causes, confirmed by pathogenic PHOX2B variants. The 20/25 repeat expansion is the most frequently reported genotype in symptomatic adults. Management centers on lifelong ventilatory support, ideally noninvasive modes such as AVAPS. Supplemental oxygen alone may worsen hypercapnia if ventilatory drive remains impaired. Patients require ongoing monitoring for autonomic complications, particularly cardiac arrhythmias, and avoidance of respiratory depressants. Genetic counseling is recommended due to the heritable nature and variable expression of PHOX2B mutations. This case highlights the importance of considering adult-onset CCHS in patients with unexplained hypercapnia and nocturnal hypoventilation, even after a negative pulmonary and neuromuscular workup, and underscores the role

of physiologic assessment combined with genetic testing for diagnosis, management, and counseling.

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1285

A FIRST CASE OF COMPULSIVE AMNESTIC NOCTURNAL SLEEP-RELATED SHOPPING INDUCED BY PRAMIPEXOLE THERAPY OF RESTLESS LEG SYNDROME

Michael Todd¹, Carlos Schenck¹, Erin Golden², Ranji Varghese¹

¹Hennepin County Medical Center, ²Department of Sleep Medicine, Hennepin Healthcare

Introduction: Dopamine agonists such as pramipexole/ropinirole are treatments for restless legs syndrome (RLS) and Parkinson's disease. It is well established that these medications can cause impulse control disorders (ICDs), side effects with serious and potentially life-altering consequences. ICDs are recurrent difficult to resist behaviors that can be harmful to the patient or others around them. Common examples include pathologic gambling, sexual behaviors, eating, and shopping. We present a patient with RLS who developed pathologic nocturnal sleep related shopping, without recall of the events, which resolved after stopping pramipexole.

Report of case(s): A 58-year-old woman presented with a 28-year history of RLS, for which she was initially prescribed pramipexole. She denied a prior history of parasomnias or compulsive behaviors. After starting pramipexole, she reported episodes of pathologic nocturnal shopping, without recollection of the events. For example, she would awaken each morning to discover orders placed online for various items, but did not remember doing so. Unnecessary items such as kitchen knives, T-shirts, and vacuum parts would later arrive at her home. These items were also ordered in exceptionally high quantities, such as 60 kitchen knives. The time-stamped purchases took place on average 1 hour after sleep onset. During the daytime she took protective and compensatory measures such as removing credit cards from common retail websites and returning items. However, during each event she navigated around the safeguards placed, such as purchasing personalized items that could not be returned. She reported feeling ashamed of what was happening but was too embarrassed to discuss this with her doctor. Eventually, the nocturnal shopping caused strain on her marriage and drove her into debt. After hearing stories of impulsive behavior from other patients on pramipexole, she disclosed her symptoms to her doctor. After switching from pramipexole to ropinirole, her nocturnal shopping behavior ended.

Conclusion: This is the first case of pramipexole induced sleep-related ICD, with severe negative impact. The symptomatology can be so unusual that patients might be reluctant to discuss with their prescribing doctor. When prescribing dopamine

agonists, providers should counsel patients on the symptoms of ICD, including manifestations during wakefulness and sleep.

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1286

SLEEPING TOGETHER, WAKING APART: DIVERGENT SLEEP CYCLES IN CONJOINED TWINS

Sujith Modugula¹, Kathy Chan², Liz Lezama², Kamal Naqvi¹, Fayruz Araj¹, Anna Wani³

¹University of Texas Southwestern Medical Center, ²University of Texas Southwestern, ³Children's Health

Introduction: The regulation of sleep, the balance between homeostatic sleep pressure (Process S) and circadian rhythm (Process C), is historically debated as either a humoral phenomenon driven by circulating somnogens or a local neural network process. Craniopagus conjoined twins sharing vasculature, but two separate central nervous systems offer a rare natural model to isolate these variables. We present polysomnographic (PSG) findings in 20-month-old craniopagus twins demonstrating independent sleep-wake cycles and divergent respiratory phenotypes despite shared circulation.

Report of case(s): Twenty-month-old female craniopagus twins presented for sleep-disordered breathing evaluation following witnessed positional apnea during anesthesia induction. A modified PSG montage was utilized due to vertical calvarial fusion. Unique "tandem-wedge" positioning with a foam overlay was required to elevate Twin B's thorax relative to Twin A to prevent cervical hyperflexion. A split-headbox configuration captured accessible frontal and central leads relative to each twin's sagittal midline.

Conclusion: The twins demonstrated divergent respiratory severity but a shared mechanistic phenotype. Twin A exhibited Mild Obstructive Sleep Apnea (OSA) [oAHI 4.0/hr; nadir SpO₂ 90%]. In contrast, Twin B demonstrated Severe OSA [oAHI 13.6/hr] with profound hypoxemia [nadir SpO₂ 69%]. Despite the severity disparity, both twins displayed marked REM-dependent obstruction (REM-AHI 23.6/hr and 44.6/hr, respectively), confirming a shared structural-positional vulnerability exacerbated by REM atonia. Crucially, hypnogram analysis revealed asynchronous sleep-wake states; Twin B sustained consolidated N3 sleep during periods of documented wakefulness in Twin A. The documentation of asynchronous sleep staging and independent arousals suggests sleep pressure is driven by individual, use-dependent neuronal networks rather than circulating humoral factors alone. Despite efforts to optimize alignment with foam overlay and split headbox, we cannot rule out that some discrepancy in apnea severity is from unavoidable neck flexion. More research of conjoined twins

of different ages could be useful to further explore the intricacies of sleep mechanisms.

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1287

SCREEN TIME TO DREAM TIME: A NOVEL CASE OF TECHNOLOGY-ASSOCIATED PARASOMNIA (TAP)

Amanda Radtke¹, H. Scheuller², Zahari Tchopev², Victoria Cocozza², Alexandra Ables¹, Nolan Carlile¹, Jaclyn Faulk¹, Ryan Matheson¹, Matthew Brock²

¹San Antonio Uniformed Services Health Education Consortium, ²Wilford Hall Ambulatory Surgical Center

Introduction: While the negative impacts of technology on sleep architecture are well-documented, parasomnias involving digital devices remain underrecognized. We present the first video-documented case of persistent smartphone use during sleep and propose diagnostic criteria for a novel parasomnia subtype: Technology-Associated Parasomnia (TAP). This case highlights the potential for technology to trigger and perpetuate sleep disturbances through behaviors during sleep. This report also underscores the need for clinical recognition of this increasingly relevant sleep disorder in our technology-saturated society.

Report of case(s): A 26-year-old male presented with difficulty falling asleep, non-restorative sleep, nocturnal awakenings, and daytime sleepiness. He reported habitual phone use in bed but denied parasomnia history. Video-polysomnography (v-PSG) revealed prolonged sleep latency, decreased sleep efficiency, and sleep fragmentation. Video showed 225 minutes of awake phone use after lights off and 143 minutes of continued phone holding after sleep onset, including 51.5 minutes with the screen inactive. The patient repositioned the phone and maintained a screen-viewing grasp, even during stage R sleep, exhibiting REM without atonia (RWA). RWA Index was 19.6% with chin EMG and 37.0% with chin and tibialis anterior EMG. These behaviors spanned all sleep stages. The patient had no recollection of these behaviors the following morning. There was no sleep-disordered breathing or periodic limb movements of sleep.

Conclusion: This case provides objective, video-based evidence of technology-driven behaviors persisting into sleep, contributing to arousals and sleep fragmentation. We propose formal diagnostic criteria for TAP as a distinct parasomnia subtype. This report underscores the importance of recognizing TAP, particularly given the lack of patient recall, which may lead to underdiagnosis and chronic sleep disruption. Further research is needed to fully characterize the clinical implications of TAP and develop effective interventions.

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1288

PRIMARY EPIGLOTTIC COLLAPSE: AN UNUSUAL PRESENTATION OF OBSTRUCTIVE SLEEP APNEA REQUIRING MULTIDISCIPLINARY MANAGEMENTRehab Talat, Miriam Jaziri, Maren Hyde-Nolan, Andrea Plawecki
Henry Ford Hospital

Introduction: Among different upper airway anatomic sites that can contribute to obstruction in patients with obstructive sleep apnea (OSA), primary epiglottic collapse has been one of the most understudied entities. Epiglottic collapse has been associated with milder OSA severity, lower BMI, and higher rates of failure with PAP therapy. Despite a growing understanding of this pattern of obstruction, a drug-induced sleep endoscopy is typically needed to make the diagnosis. In patients with primary epiglottic collapse, the epiglottic stiffening procedure can be an effective treatment for OSA.

Report of case(s): We report the case of a 33-year-old male patient with a history of mild OSA with an apnea hypopnea index of 10.7 diagnosed via an in-lab polysomnography (PSG) in 2019. The patient was unable to tolerate a continuous positive airway pressure machine. He additionally had a custom-made adjustable oral appliance that did not control his symptoms, primarily snoring, waking up gasping for air, globus, choking, and non-refreshing sleep. He developed comorbid insomnia inadequately treated by pharmacotherapy (melatonin, zaleplon, and trazodone). Due to the refractory nature and severity of his obstructive symptoms, he was referred to ENT for evaluation. He underwent a DISE, which showed complete independent anteroposterior epiglottic collapse. To address the primary site of obstruction, he subsequently underwent the epiglottic stiffening procedure and had an uneventful recovery. At his clinic follow-up, he reported significant improvement in obstructive symptoms of choking and snoring. His 3-month postop PSG showed an AHI of 3.6. Sleep quality improved; however, his insomnia symptoms persisted despite resolution in OSA. Cognitive behavioral therapy for insomnia was initiated.

Conclusion: Patients with OSA who have primary epiglottic collapse may have a unique presentation and can be quite symptomatic despite milder severity of OSA. The epiglottic stiffening procedure can effectively treat obstructive sleep apnea in a subset of patients where the epiglottis is the primary site of airway collapse. Comorbid insomnia may also need to be addressed separately. This case report highlights the importance of multidisciplinary management in the workup of refractory obstructive sleep apnea.

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1289

LATE ONSET LARYNGOMALACIA MANIFESTING AS SEVERE OBSTRUCTIVE SLEEP APNEA IN A 14-YEAR-OLD MALENicholas Friedman, Laura Mulreany, Jonathan Perkins, J. Kent Werner
Walter Reed National Military Medical Center

Introduction: Laryngomalacia is a common occurrence in infants but a very rare phenomenon in adolescents and adults. It can present as stridor, snoring, exercise intolerance, or dysphagia. Diagnosis is confirmed with bronchoscopy. We present a case of

a 14-year-old male with late onset laryngomalacia manifesting as severe obstructive sleep apnea (OSA).

Report of case(s): Fourteen year-old male with history of presumed perinatal left MCA stroke, Lennox-Gastaut syndrome, hemiplegic cerebral palsy, and intellectual disability. He presented to Pediatric Pulmonology with a two-month history of new-onset snoring and worsening oral aversion/dysphagia. His mother disclosed videos illustrating his severe snoring, apneic pauses, and gasping during sleep. Prior to this two-month period, the patient had no snoring nor signs/symptoms of sleep disordered breathing for at least ten years. Patient history included tonsillectomy and adenoidectomy at 4-years-old for suspicion of OSA. Polysomnography (PSG) was performed and revealed severe OSA with apnea hypopnea index (AHI) of 31.8 and oxygen desaturation nadir of 70%, with minimal central apneas. No seizure activity was appreciated. Due to concern that patient's vagal nerve stimulator (VNS) was negatively contributing to OSA by causing airway collapse, a drug-induced sleep endoscopy (DISE) with microlaryngoscopy, rigid bronchoscopy, and flexible bronchoscopy was performed. Airway evaluation revealed severe laryngomalacia with complete arytenoid prolapse, shortened epiglottic folds, and epiglottic retroflexion. No evidence of tracheomalacia or bronchomalacia was seen. No difference in the severity of laryngomalacia or upper airway collapse was noted between VNS being on or off during DISE. Thus, VNS was continued, and airway obstruction was treated with positive airway pressure (PAP) therapy. Patient underwent a PAP titration PSG, which resulted in a pressure at 7 centimeters of water. At higher pressures, treatment emergent central sleep apnea developed. Home PAP therapy was initiated successfully with good compliance and resolution of observed apneas and snoring at 2 month follow-up, with corrected AHI of 2.2. Supraglottoplasty for surgical correction of severe laryngomalacia is planned. Post-operatively, patient will undergo follow-up PSG and PAP titration, as indicated.

Conclusion: Late onset laryngomalacia is a rare phenomenon in adults and adolescents. Diagnosis should be considered in patients with snoring, stridor, OSA, or dysphagia.

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1290

WAKE UP CALL: HOW UNDERTREATED OBSTRUCTED SLEEP APNEA CAN LEAD TO MULTISYSTEM MORBIDITY DESPITE THERAPY

Tina Thomas, Rabia Bajwa

Indiana Regional Medical Center

Introduction: Obstructive Sleep Apnea (OSA) is a disorder characterized by complete or partial collapse of the upper airway during sleep. Apnea-hypopnea index (AHI) and oxygen desaturation on polysomnogram (PSG), along with symptoms, are used to diagnose and assess treatment success. Both untreated and undertreated OSA are underlying contributors to cardiovascular or neurological conditions, such as stroke, atrial fibrillation, myocardial infarction, and cognitive impairment.

Report of case(s): A 79-year-old overweight female (BMI 27 kg/m²) with a medical history of hypertension, hypothyroidism, hyperlipidemia, post-traumatic stress disorder, fibromyalgia, pulmonary hypertension, and OSA on continuous positive airway pressure (CPAP) was admitted to the hospital with new onset atrial fibrillation and pre-syncope. The patient was discharged

with an ambulatory cardiac monitor, which detected episodes of supraventricular tachycardia. She was referred to a sleep disorder clinic because of new-onset arrhythmia, fatigue, and mental foginess. The patient was diagnosed with OSA in 2020 at an out-of-state facility, but endorsed air swallowing and abdominal bloating on CPAP therapy. Her device report showed 90% usage, averaging 6 hours 56 minutes per night, with a residual AHI of 2.3 events/hour, but large mask leaks on most nights. Despite therapy adherence and low residual AHI, the patient continued to report cognitive impairment, fatigue, and palpitations. She underwent a repeat in-lab polysomnography, which demonstrated frequent nocturnal awakenings, nocturnal hypoxemia, and AHI 12 events/hr. The patient was initiated on bilevel positive airway pressure and titrated until minimal apnea-hypopnea events were noted. At follow-up, the patient reported significant improvement in quality of life, daytime alertness, and cognitive function. A Montreal Cognitive Assessment performed before and after optimizing treatment showed improvement of mild cognitive impairment (24/30) to normal cognition (28/30), along with improvements in blood pressure and heart rate control.

Conclusion: This case demonstrates that obstructive sleep apnea can be undertreated even in the setting of reported adherence and low residual AHI. Persistent fatigue, cognitive, or cardiovascular changes should prompt reassessment of treatment efficacy. This includes evaluation for mask leak, pressure setting, or need for repeat testing. Recognizing inadequately treated OSA as a reversible risk factor is important to improve patient outcomes.

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1291

PERSISTENT OBSTRUCTIVE SLEEP APNEA AFTER MARKED POST-BARIATRIC SURGERY WEIGHT LOSS: A CASE REPORT FROM THE MIAMI VA

Emma Lipshultz¹, Ivan Escalona Puig¹, Snigdha Ila¹, Alexandre Abreu², Kori Ascher², Hao Cheng³, Eric Geil³

¹University of Miami/Miami VA Medical Center, ²University of Miami, ³Miami VA Medical Center

Introduction: Weight loss following bariatric surgery is associated with substantial improvement in obstructive sleep apnea (OSA), with prior studies demonstrating that a $\geq 10\%$ reduction in body weight may decrease the apnea-hypopnea index (AHI) by up to 50%. Despite these improvements, complete resolution of OSA is uncommon, and many patients do not undergo repeat sleep evaluation after significant weight loss. This case highlights the importance of reassessing sleep-disordered breathing following major post-bariatric weight reduction, particularly when obesity hypoventilation syndrome (OHS) was previously suspected.

Report of case(s): A 61-year-old veteran was diagnosed in 2015 with severe OSA on home sleep apnea testing, demonstrating a respiratory event index (REI) of 66 events/hour (supine REI 93 events/hour), oxygen saturation nadir of 48% and 78 minutes with $\text{SpO}_2 < 88\%$ at a body mass index (BMI) of 56. An in-laboratory positive airway pressure (PAP) titration revealed persistently severe residual respiratory events across all tested pressures (titration AHI 98.5 events/hour; supine AHI 121.5 events/hour), profound REM-related hypoxemia (nadir 56%), treatment-emergent central sleep apnea, and limited pressure tolerance, precluding identification of effective settings. Auto-bilevel PAP was initiated empirically. In the absence of arterial blood gas data, severe

nocturnal hypoxemia and mildly elevated serum bicarbonate (26–27 mmol/L) raised concern for OHS. Following Roux-en-Y gastric bypass surgery, the patient achieved a sustained 57.3% total body weight reduction (440 lb to 188 lb; BMI 56 to 27). After a nine-year lapse in follow-up, he re-presented in 2025 with persistent hypersomnolence (Epworth Sleepiness Scale 16) and insomnia (Insomnia Severity Index 25). Serum bicarbonate was 23 mmol/L. Repeat polysomnography demonstrated residual moderate OSA (AHI 25.2 events/hour; supine AHI 41.9 events/hour; non-supine AHI 8.8 events/hour), oxygen saturation nadir 78%, and 6 minutes with $\text{SpO}_2 < 90\%$, representing a 61.8% reduction from baseline.

Conclusion: Despite profound weight loss and normalization of biochemical markers previously suggestive of hypoventilation, clinically significant OSA persisted. Weight reduction alone is an unreliable marker of OSA resolution. Repeat polysomnography after weight stabilization is essential to reassess residual disease, evaluate hypoventilation risk, and optimize long term therapy.

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1292

UNDIAGNOSED ACROMEGALY PRESENTING AS OBSTRUCTIVE SLEEP APNEA IN A PATIENT WITH CRANIOFACIAL ABNORMALITIES

Diana Rios, Drew Robinson

University of Alabama at Birmingham

Introduction: Obstructive sleep apnea (OSA) is commonly associated with obesity, enlarged neck circumference, central body fat distribution, or craniofacial abnormalities which can result in anatomical narrowing of the upper airway. OSA affects between 20–90% of patients with acromegaly. Acromegaly is characterized by growth hormone (GH) induced soft tissue hypertrophy and coarse facial features, typically due to a pituitary adenoma. OSA in acromegalic patients is due to both hormonal excess and associated craniofacial abnormalities. We present a case of acromegaly diagnosed during evaluation for sleep apnea in a patient undergoing preoperative evaluation for orthognathic surgery.

Report of case(s): A 38-year-old male without significant past medical history was referred to Sleep Medicine for evaluation of sleep apnea prior to planned orthognathic surgery for mandibular prognathism and malocclusion. He reported a history of loud snoring, witnessed apneas, excessive daytime sleepiness, and nonrestorative sleep. There was no prior sleep study. On physical examination, the patient had a large mandible, frontal bossing, widely spaced teeth, macroglossia, and enlarged hands and feet. Vital signs were unremarkable. Body mass index (BMI) was 30.1 kg/m². Due to concern for acromegaly, serum IGF-1 level was obtained and found to be markedly elevated at 900 ng/mL (reference range: ~100–300 ng/mL, age-adjusted). Subsequent growth hormone suppression testing was consistent with autonomous GH secretion. Pituitary MRI revealed a 1 cm adenoma within the sella turcica, without compression of the optic chiasm. Polysomnography demonstrated severe OSA with an apnea-hypopnea index (AHI) of 38 events/hour. CPAP titration improved symptoms and oxygenation. The patient was referred to endocrinology and neurosurgery for further management. Transsphenoidal resection of the adenoma was planned, with the orthognathic surgery deferred pending endocrine stabilization.

Conclusion: Detailed physical examination of patients being evaluated for OSA is crucial. Recognition of features of acromegaly,

particularly when caused by a GH-secreting pituitary adenoma, alters the treatment plan and affects outcomes. In such patients, addressing the underlying endocrine dysfunction prior to reconstructive surgery is essential, as ongoing GH excess could lead to recurrence of deformity, and cause worsening OSA. Conversely, treatment of acromegaly is associated with significant improvement in sleep apnea parameters.

Support (if any):

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1293

UNDERRECOGNIZED SEVERE SLEEP-DISORDERED BREATHING IN PITUITARY-DEPENDENT CUSHING'S DISEASE: A BIDIRECTIONAL CHALLENGE

Sheila Rajan, Aarti Grover, Greg Schumaker, Joel Oster, Wei He, Rajesh Zacharias

Tufts University, Tufts Medical Center

Introduction: Cushing's syndrome, defined by chronic hypercortisolism, is associated with an increased prevalence of obstructive sleep apnea (OSA). Cushing's disease, caused by ACTH-secreting pituitary adenomas, represents a specific subset of this disorder. Although OSA is increasingly recognized in hypercortisolemic states, detailed descriptions of severe OSA in Cushing's disease remain limited. We present a case in which the diagnosis of severe OSA was delayed until after endocrine evaluation and surgical management.

Report of case(s): A 40-year-old female with type 2 diabetes and hyperlipidemia was evaluated for progressive weight gain and worsening glycemic control. She reported a 100-pound weight gain over five years despite sustained lifestyle efforts. Physical examination revealed nuchal and supraclavicular fat pads and purple striae, prompting evaluation for Cushing's disease. Laboratory studies confirmed hypercortisolism, and pituitary MRI identified a macroadenoma invading the right cavernous sinus. She underwent endoscopic transsphenoidal resection, but hypercortisolism persisted postoperatively with residual tumor noted. During this period, she endorsed symptoms of OSA, including loud snoring, witnessed apneas, morning headaches, dry mouth, impaired concentration, and daytime fatigue. Home sleep apnea testing performed after her endocrine work-up confirmed severe OSA, with an apnea-hypopnea index of 98.3 events per hour and an oxygen saturation nadir of 51%. Although obesity and altered fat distribution are established contributors to OSA, the severity of sleep-disordered breathing appeared disproportionate to her anthropometric profile. Features of hypercortisolism, such as central fat deposition and dorsocervical fat accumulation, likely intensified upper airway obstruction, consistent with evidence that elevated cortisol independently correlates with increased OSA risk.

Conclusion: Population-based data show that Cushing's syndrome confers a 2.82-fold increased risk of OSA independent of weight. Conversely, severe untreated OSA can produce a pseudo-Cushing's biochemical pattern, and one case series has demonstrated biochemical improvement in hypercortisolism after CPAP therapy. This bidirectional relationship complicates diagnostic

interpretation. This case highlights that OSA in pituitary-dependent Cushing's disease can be extremely severe and may go underrecognized during initial endocrine evaluation. Clinicians should maintain a low threshold for sleep assessment in hypercortisolemic patients and consider incorporating screening into the pre-operative work-up. Early identification and treatment may improve cardiometabolic outcomes and quality of life.

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1294

A NIGHTLY POUR, A DANGEROUS FALL: A CASE OF DAILY ALCOHOL USE FOR INSOMNIA PRECEDING A TRAUMATIC INTRACRANIAL BLEED

Olivia Choi, Andrew Berta

Temple Chestnut Hill Hospital Family Medicine Residency

Introduction: Sleep disturbances are common in older adults, with aging being associated with decreased total sleep time and a delayed circadian phase. Though there are fewer self-reported complaints of insomnia rates in older adults than in younger individuals, they remain more vulnerable to worse mental health outcomes and decline in cognitive function. Depression and anxiety can be both risk factors and morbidities with sleep difficulties, leading to poorer sleep efficiency in this population. Untreated insomnia and its psychiatric comorbidities can lead to misuse of alcohol as a form of self-medication. This case highlights a case of an alcohol use disorder (AUD) patient with depression and anxiety in an outpatient setting, leading to hospitalization with a traumatic fall.

Report of case(s): An 82-year-old male, with a longstanding history of alcohol abuse up to 13 years, presented to the clinic with complaints of nighttime coughing and difficulty sleeping. He reported being under stress due to financial and housing instability and has been drinking a bottle of wine daily to cope with stress and insomnia. Acute coughing has worsened his ability to fall asleep, prompting him to request sleep aid medication. After initial evaluation for aspiration pneumonia, follow-up for the AUD was arranged, but the patient declined intervention. Four months later, the patient presented to the hospital after multiple falls over 3-4 months and 4 weeks of acute dysphagia. Imaging revealed chronic stable subdural hematoma, internal carotid artery dissection, and cervical spine osteophytes displacing the esophagus. No surgical intervention was performed for intracranial bleeding. A PEG tube was placed for dysphagia, and alcohol cessation counseling was performed at the hospital. At the 1-month post-hospitalization visit, the patient reported abstinence from alcohol, improvement in sleep quality, dysphagia, and cognitive function.

Conclusion: This case illustrates the interplay between insomnia, psychiatric comorbidities, and maladaptive coping behaviors in elderly. This patient's chronic reliance on alcohol as a sleeping aid and anxiety aid has masked a progressive functional decline, culminating in multiple falls that resulted in neurologic and structural traumas. Early recognition and intervention for insomnia and alcohol use, especially in geriatric patients with psychosocial stressors, may prevent escalation into severe morbidity.

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1295

A HIGH-PRESSURE SITUATION: MULTIMODAL TREATMENT APPROACH FOR A PEDIATRIC PATIENT WITH SEVERE OBSTRUCTIVE SLEEP APNEA AND SEVERE PULMONARY HYPERTENSION

Victoria Wang¹, DeLise Rhea², Nidhy Varghese³, Binal Kancherla³
¹Baylor College of Medicine, ²Texas Children's Hospital, ³Baylor College of Medicine / Texas Children's Hospital

Introduction: The link between sleep disordered breathing (SDB) and pulmonary hypertension (PH) in children is not well understood. Management of these patients with SDB and comorbid PH usually begins with treatment of the SDB with positive airway pressure therapy. In patients with SDB and severe PH, additional therapies might be necessary. We present a case of a child with severe obstructive sleep apnea (OSA)-associated PH, who underwent a multimodal treatment approach for stabilization.

Report of case(s): A 10-year-old male with obesity, prediabetes and hypertriglyceridemia presented with extreme somnolence and desaturation to 80% on room air while seated in otolaryngology clinic. History elicited in Sleep Clinic the day prior included six-month history of snoring, frequent apnea and cyanosis. He was urgently admitted to the pediatric intensive care unit and empirically started and titrated on bilevel positive airway pressure to 20/10 cmH₂O. His labs showed respiratory acidosis with metabolic compensation suggestive of chronic hypoventilation. An echocardiogram was obtained which showed systolic bowing of the interventricular septum with right ventricular hypertrophy (RVH) and low normal systolic function suggestive of severe PH. Inhaled nitric oxide was started for stabilization and transitioned to tadalafil. Polysomnogram showed a baseline apnea hypopnea index (AHI) of 178.3/hr. During the titration portion of the study, his OSA was only partially treated with a max pressure of 20/16 cmH₂O so he was started on assured pressure support for targeted volume by non-invasive positive pressure ventilation (NIPPV). Surgical intervention was deferred until PH was improved. Over the next four months, parents reported less daytime sleepiness and absence of snoring. He had improved clinical assessment by six-minute walk test and successfully started a weight management program. Echocardiogram demonstrated normal septal motion and resolved RVH, so he underwent tonsillectomy adenoidectomy with a drug-induced sleep endoscopy by the otolaryngology service. He was maintained on tadalafil and NIPPV through surgery and post-operative period for continued rehabilitation.

Conclusion: This case highlights the need for a multi-disciplinary approach to the management and evaluation of patients with severe OSA-associated PH. Use of PH medications may be needed to afford clinical stabilization while SDB work up and management continues.

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1296

SURGICAL MANAGEMENT OF OSA IN A PATIENT WITH LARYNGOMALACIA AND TONSILLAR HYPERTROPHY

James Hall¹, Naomi Ghildiyal², Mercy Azubuko-Uduh², Alok Pant², Minh Tam Ho², Shiela Asghar², Oleg Cherynshev³

¹Ochsner-LSU Health Shreveport Medical Center, ²Ochsner LSU Health Medical Center, ³LSU Health Sciences Center at Shreveport

Introduction: Laryngomalacia is a dynamic airway obstruction which causes collapse of supraglottic structures into the airway during inspiration causing stridor and can lead to upper airway obstruction and obstructive sleep apnea.

Report of case(s): Patient is a 4-year-old with history of GDD, Cerebral palsy and Sleep apnea. He has issues with usage of CPAP and surgical options were considered for management of OSA due to multifactorial causes. PSG initially done in 2021 showed AHI 8.2/hr of sleep. Patient underwent evaluation, supraglottoplasty for tracheobronchomalacia, adenoidectomy in 2022 and underwent bilateral tonsillectomy in April 2024. Repeat PSG in Aug 2024 showing AHI 8.2, O₂ nadir 93%. supraglottoplasty, adenoidectomy, PE tube replacement on in 2022. Patient was seen in clinic on 09/18/24 and Auto CPAP prescription was sent and was pending evaluation by ENT considering surgical history. The patient then underwent DISE on March 2025 which showed Laryngomalacia and was scheduled for supraglottoplasty in May 2025. After the supraglottoplasty, the patient was reevaluated in sleep clinic and showed significant improvement per the mother and his snoring also improved. His sleep study following the surgery showed an AHI of 6.4/hr. of sleep and minimum oxygen saturation of 90%.

Conclusion: Laryngomalacia may cause OSA due to dynamic obstruction of the airway and patients benefit surgical correction.

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1297

BREATH-HOLDING SPELL TRIGGERED BY CPAP IN A 2-YEAR-OLD CHILD WITH CORNELIA DE LANGE SYNDROME AND SEVERE OBSTRUCTIVE SLEEP APNEA

Funmi Alabi¹, Daniel Combs²

¹University of Arizona, Tucson, ²University of Arizona

Introduction: Breath-holding spells are benign paroxysmal events occurring in early childhood, most often triggered by emotional upset or painful stimuli. Continuous positive airway pressure (CPAP) therapy is commonly used in pediatric obstructive sleep apnea (OSA), though initiation may be stressful. To our knowledge, there are no prior reports of breath-holding spells associated with CPAP. Here, we describe what appears to be the first reported case

of a cyanotic breath-holding spell occurring immediately after CPAP initiation in a 2-year-old child.

Report of case(s): A 2-year-old boy with Cornelia de Lange syndrome and severe OSA (Obstructive apnea-hypopnea index of 65 events/hour) had sustained apnea and cyanosis immediately after CPAP initiation in the sleep lab. A rapid response was called and cardiopulmonary resuscitation was started, but patient quickly spontaneously recovered. The patient was subsequently admitted to the hospital for monitoring. CPAP was reattempted twice in the hospital and patient again had apnea with cyanosis and bradycardia. On the first attempt, recorded oxygen saturation decreased from 100% to 18% on CPAP and heart rate decreased from 143 to 70 beats per minute. On a repeat CPAP attempt after one hour, the patient again had apnea and oxygen saturation decreased to 66% and heart rate decreased from 180 to 51. The CPAP mask was removed and the patient spontaneously recovered both times. Given this CPAP intolerance, the patient was discharged home with oxygen at night for treatment of OSA. Overnight oximetry on 0.2 liter per minute of oxygen via nasal cannula showed an oxygen desaturation index of 11 events/hour and 6.1% of the night with an oxygen saturation below 90%.

Conclusion: Children with Cornelia de Lange syndrome and severe OSA are at a risk for breath-holding spells. CPAP initiation may trigger breath holding spells and sleep medicine clinicians should be aware of this to avoid unnecessary interventions. There is some evidence that behavioral interventions can lessen breath-holding spells in children with Cornelia de Lange syndrome, but treatments other than CPAP may be necessary in some cases.

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1298

ENDLESS NIGHTS: EPIC DREAMING AND RESPONSE TO CYPROHEPTADINE

Arashdeep Rupal¹, Erin Golden¹, Muna Irfan²

¹Department of Sleep Medicine, Hennepin Healthcare,

²Department of Sleep Medicine, Minneapolis VA Medical Center

Introduction: Epic dreaming, though not formally defined in major sleep medicine guidelines, is recognized in clinical practice as unusually vivid, mundane, and immersive dreaming that unfolds in prolonged, elaborate, narrative-rich sequences. Patients often report dreaming continuously throughout the night, frequently involving relentless or repetitive activity, such as endlessly walking, that leaves them feeling drained upon awakening. Clinically, epic dreaming is significant because it frequently accompanies fragmented, non-restorative sleep and marked daytime fatigue, even when objective sleep evaluations are unremarkable. Given its rarity and the absence of standardized criteria, formal treatment guidelines are lacking.

Report of case(s): We present the case of a 47-year-old male with generalized anxiety disorder and asthma with a long-standing history of nightly epic dreaming, describing vivid, immersive dreams often centered on unsuccessful attempts to resolve a problem. These dreams lasted throughout the night, triggered two to three awakenings, and left him exhausted, struggling to resume sleep, and markedly fatigued during the day. He denied alcohol or recreational drug use. Notably, several relatives—including his brother, maternal cousin, and maternal aunt—reported similar dream patterns. A prior home sleep apnea test was unremarkable. Trials of anxiolytics and melatonin were ineffective, and prazosin

provided only minimal benefit before being discontinued due to orthostatic dizziness. At the initial visit, cyproheptadine 4 mg nightly was started and a referral for CBT-I placed. The dose was gradually increased to 12 mg nightly. At one-month follow-up, he reported a meaningful reduction in dream frequency and intensity, improved sleep continuity with only one nighttime awakening, and less daytime fatigue. Although epic dreaming persisted, it was largely confined to the latter part of the night and was considerably less draining than before.

Conclusion: Epic dreaming presents as vividly immersive, narrative-rich dreaming that can lead to significant sleep disruption and daytime fatigue. Sustained dreaming has been reported to occur in both REM and non-REM sleep. This case demonstrates that cyproheptadine may provide meaningful symptomatic improvement, potentially through its known effects on suppressing REM and enhancing slow-wave sleep. The occurrence of similar dreaming patterns in multiple relatives raises the possibility of a familial predisposition and underscores the need for further research.

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1300

SLEEP DISORDERED BREATHING, OBESITY HYPOVENTILATION AND SEVERE HEART FAILURE WITH REDUCED EJECTION FRACTION: CPAP AS A MANAGEMENT TOOL

Esime Agbloyor¹, Nathan Nowalk², Alejandra Lastra³, Gorav Sharma⁴, Henry Arantes³, Franco Laghi³

¹Sinai Hospital of Baltimore, ²University of Pennsylvania,

³University of Chicago, ⁴The University of Chicago, Section of Pulmonary and Critical Care

Introduction: Sleep disordered breathing is prevalent in persons with heart failure (HF). The prevalence of obesity in persons with HF is expected to increase with the obesity pandemic, together with the risk of sleep-related hypoventilation. Managing patients with these significant comorbidities presents unique challenges and considerations. We present a case of chronic HF with reduced ejection fraction (HFrEF) and obesity hypoventilation syndrome (OHS).

Report of case(s): A 58-year-old man presented for titration polysomnography (PSG) with OHS (daytime PaCO₂ = 53 mmHg; BMI 35kg/m²), severe obstructive sleep apnea (OSA) (apnea-hypopnea index (AHI)=68) and mild central sleep apnea (CSA) (AHI=10), chronic hypoxic respiratory failure (4 liters/min domiciliary oxygen), and HFrEF (LVEF 10%) on domiciliary milrinone infusion. His dry weight was 115kg. Titration PSG was started on continuous positive airway pressure (CPAP), which was quickly transitioned to bi-level PAP for hypoventilation and titrated to 24/10 cm H₂O. Increasing PAP showed improvement in hypoventilation, but significant worsening of hypoxia requiring 6 liter-s/min oxygen. For this reason, and the emergence of central hypopneas, the patient was prescribed fixed CPAP at 10 cm H₂O with 4 liters/min nocturnal oxygen. He displayed strong CPAP

adherence while monitored with home oximetry and underwent repeat titration PSGs. Final titration PSG showed resolution of both hypercapnia and hypoxia. He was continued on CPAP at 10cm H₂O without supplemental oxygen.

Conclusion: Comorbid obesity and sleep-related hypoventilation are increasingly encountered in HFrEF. Elevated PAP administration aimed at correcting hypoventilation during PSG may increase intrathoracic pressure leading to increased right ventricular (RV) afterload and compromised cardiac output. Additionally, elevated RV afterload can result in right-to-left shunting and refractory hypoxia, as suggested by our case. Furthermore, it is unclear whether chronic hypercapnia in OHS protects against CSA of HF or increases susceptibility to CSA during non-invasive ventilation. While PAP provides respiratory benefits, it must be used cautiously in patients with advanced HF. Regular CPAP use in patients with OHS has previously shown improvement in hypoxia and hypercapnia after six weeks of adherent treatment. Individualized therapy, guided by repeat PSG and home nocturnal oximetry or capnography, is essential for optimal management of this complex, high-risk population.

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1301

PNEUMOTHORAX AS A RARE COMPLICATION OF ADAPTIVE SERVO-VENTILATION IN A PATIENT WITH OBSTRUCTIVE SLEEP APNEA: A CASE REPORT

Naima Sultana, Chelsea Kolodziej, Mirza Abu Sayeem
Marion Health

Introduction: Positive airway pressure (PAP) therapy is the first-line treatment for obstructive sleep apnea (OSA; Veasey & Rosen, 2019). Although this treatment is effective, rare and often under-reported complications, such as pneumothorax, have been documented—particularly with high-pressure noninvasive ventilation (Rajdev et al., 2020). Treatment of OSA can be further complicated by the presence of comorbidities such as atrial fibrillation (Linz et al., 2021).

Report of case(s): We report the case of a 67-year-old male with a history of hypertension, dyslipidemia, atrial fibrillation in remission (status post ablation), and previously diagnosed moderate OSA on CPAP therapy who experienced a severe right-sided pneumothorax after being switched to adaptive servo-ventilation (ASV) following the diagnosis of atrial fibrillation.

Conclusion: Sleep apnea severity and phenotype can change over time as new health conditions emerge. This case highlights the importance of vigilant and routine monitoring. Careful follow-up and reassessment of PAP modality and pressure can minimize the risk of pneumothorax, a potentially life-threatening complication. This case further demonstrates the need for ongoing evaluation by an expert clinician, particularly for high-risk patients treated with high-pressure PAP using advanced modalities.

Support (if any): 1. Veasey, S. C., & Rosen, I. M. (2019). Obstructive sleep apnea in adults. *The New England Journal of Medicine*, 380(15), 1442–1449. <https://doi.org/10.1056/NEJMcp1816152> 2. Rajdev, K., Idiculla, P. S., Sharma, S., Von Essen, S. G., Murphy, P. J., & Bista, S. (2020). Recurrent pneumothorax with CPAP therapy for obstructive sleep apnea. *Case Reports in Pulmonology*, 2020, Article 8898621. <https://doi.org/10.1155/2020/8898621> 3. Linz, D., Nattel, S., Kalman, J. M., & Sanders, P. (2021). Sleep apnea and

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1302

ABLATION SUCCESS, BREATHING DISTRESS: HYPOVENTILATION DUE TO PHRENIC NERVE INJURY POST CARDIAC ABLATION

Mahathi Mudigonda, Kelly Lobrutto, Sreelatha Naik
Geisinger

Introduction: Catheter ablation is recommended for patients with persistent or paroxysmal atrial fibrillation (AF) who are refractory or intolerant to antiarrhythmic medication, with evidence supporting reduction in mortality, heart failure and stroke. Phrenic nerve injury (PNI) occurs in 0.2–4.2% of AF ablations and may lead to diaphragmatic paralysis. We report the case of a patient who after undergoing radiofrequency cardiac ablation developed PNI-related hypoventilation, which required support with noninvasive ventilation (NIV) until resolution, highlighting the importance of coordination between cardiology, pulmonary and sleep medicine.

Report of case(s): A 62-year-old woman experienced abrupt onset of dyspnea following a pulmonary vein isolation radiofrequency cardiac ablation for persistent AF after failed cardioversion and intolerance to rate-control medication. Post-procedure chest x-ray demonstrated right hemi-diaphragm elevation and follow up with fluoroscopy/sniff test noted paradoxical movement of the right hemi-diaphragm confirming paralysis. Post discharge in respiratory failure clinic, pulmonary function tests noted vital capacity of 51% of predicted, with a significant 25% decrease in vital capacity with change from upright to supine position. Nocturnal oximetry was suggestive of sleep disordered breathing. Previous sleep study prior to injury was negative for sleep apnea. Due to concern for hypoventilation likely secondary to phrenic nerve injury, surgical intervention (with plication or diaphragmatic pacing) was discussed but not elected. Thus, noninvasive mechanical ventilation was initiated. Over six months, patient's vital capacity significantly improved to 81% and repeat sniff test demonstrated resolution of diaphragmatic paralysis. Treatment with NIV was subsequently discontinued.

Conclusion: While phrenic nerve injury following AF ablation is often reversible with varying durations of recovery dependent on mode of ablation, it is important to evaluate patients for presence of hypoventilation as they may require support with NIV while awaiting recovery of diaphragm function. Sleep physicians and pulmonologists play a key role in recognizing this complication, initiating and managing NIV and understanding the natural course of recovery.

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1303

THE TIDAL VOLUME GAP: RECOGNIZING BILEVEL FAILURE IN PROGRESSIVE MOTOR NEURON DISEASE

Navneet Ramesh¹, Peter Nguyen², Janine Vintch¹

¹Harbor-UCLA, ²Rancho Los Amigos National Rehabilitation Center

Introduction: Progressive muscular atrophy (PMA) often leads to ventilatory failure that may not be fully reflected by routine pulmonary function testing. Because respiratory muscle decline is progressive, fixed-pressure bilevel ventilation may fail to provide adequate support as disease severity evolves.

Report of case(s): A 61-year-old woman presented with imbalance and distal weakness. Lower motor neuron signs on electromyography supported a diagnosis of PMA. She endorsed dyspnea both at rest and while supine, and pulmonary function testing (PFT) revealed normal spirometry, mildly reduced vital capacity (74% predicted), normal maximal inspiratory pressure, and a reduced maximal expiratory pressure (47% predicted). She also had a persistently elevated serum bicarbonate above 28 mEq/L. She began nocturnal bilevel positive airway pressure (BiPAP), but gradually developed worsening dyspnea, eventually requiring near-continuous BiPAP use. She was transitioned to Average Volume-Assured Pressure Support (AVAPS) ventilation, using a nasal mask during the day and a full-face mask at night. Following this change, she reported improved dyspnea and mask tolerance.

Conclusion: The rate of decline of respiratory muscle strength can vary in disorders of muscle atrophy. While many patients with respiratory insufficiency are started on fixed-pressure BiPAP, this mode of ventilation may become insufficient as respiratory muscle weakness progresses, even when pulmonary function testing appears relatively preserved. Specifically, the same pressure support can yield progressively smaller tidal volumes, resulting in hypercapnia, sleep fragmentation, and worsening dyspnea. This patient's normal spirometry and preserved maximal inspiratory pressure illustrate how standard PFTs may underestimate functional ventilatory impairment. In contrast, elevated bicarbonate and inadequate measured tidal volumes may be more sensitive indicators of chronic hypoventilation. Volume-assured pressure support modes such as AVAPS may be beneficial in these settings. These modes have been shown to improve ventilation stability, increase average tidal volume, and reduce nocturnal hypercapnia in certain neuromuscular and chronic hypoventilation syndromes. Additionally, optimization of non-invasive ventilation (NiV) in motor neuron disease can improve sleep continuity, sleep quality, and overall quality of life, even as the underlying neuromuscular disease continues to progress. Therefore, NiV mode selection should be continuously revisited, and volume-targeted strategies should be considered when fixed-pressure support no longer meets physiologic needs.

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1304

A CASE OF PAP-EMERGENT CENTRAL SLEEP APNEA IN A PATIENT WITH EXCESSIVE DYNAMIC AIRWAY COLLAPSE

Trevor Stantliff¹, Ann Romaker²

¹University of Cincinnati College of Medicine, ²University of Cincinnati

Introduction: Treatment-emergent central sleep apnea (TECSA) had traditionally been defined as the emergence of central apneas during PAP treatment of OSA, through mechanisms involving high loop gain - characterized by hypersensitive chemoreflex responses to PaCO₂ changes and reduced CO₂ reserve - leading to oscillations in ventilatory drive. Here we present a novel case

of PAP-emergent central sleep apnea in a patient with tracheal collapse in the absence of OSA.

Report of case(s): A 71-year-old female with a history of moderate-persistent asthma, hypertension, and left-sided diaphragmatic paralysis presented with a one-year history of progressive exertional dyspnea, central wheeze, and significant exercise intolerance following ventral hernia repair with a large mesh. She has no tobacco, alcohol, or substance use. Family history is significant for OSA but no pulmonary disease. Dynamic bronchoscopy demonstrated excessive dynamic airway collapse (EDAC), most pronounced distally, with significant improvement during CPAP titration. She was discharged with CPAP of 12cmH₂O and referred for polysomnography. Split-night polysomnography showed adequate sleep time with a baseline AHI of 3/hr and mean SpO₂ saturation 85%. CPAP was titrated to 15cmH₂O, with PAP-emergent central apneas developing at 8cmH₂O. At the targeted 12 cmH₂O, AHI peaked at 63/hr with mean SpO₂ of 87%. Given patient's emergence of central apneas with PAP therapy and lack of improvement in oxygenation, CPAP was discontinued.

Conclusion: This case represents the first reported instance of PAP-emergent central sleep apnea developing during PAP therapy for EDAC in the absence of OSA. Demonstrating that ventilatory control instability can emerge during PAP treatment of non-OSA structural airway disorders, this case extends the TECSA phenomenon beyond the diagnostic boundaries set by the International Classification of Sleep Disorder's for which diagnosis requires CSA emergence during treatment of OSA. Regardless of whether CPAP pneumatically stents the pharyngeal airway with OSA or distal trachea with EDAC, patients can be at risk for the emergence of CSA due to similar loop gain mechanism as discussed above. While most OSA-related TECSA cases spontaneously resolve with continued PAP therapy, the natural history of PAP-emergent CSA in EDAC patients is unknown. Further investigations are needed to determine the prevalence and treatment options for this patient population.

Support (if any):

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1305

AWAKENING OF A COMPLEX PATIENT: REVERSAL OF HYPOVENTILATION AND CARDIAC SEQUELAE FOLLOWING PAP INITIATION

Láís Mota¹, Geovane Viana¹, Nathalia Lemos², Caio Medina¹, Lorenzo Cirri³, Cristina Salles¹

¹Escola Bahiana de Medicina e Saúde Pública, ²Department of Medicine, Bahiana School of Health and Public Health, Salvador, Bahia, Brazil, ³Royal Brompton Hospital, Guy's and St. Thomas NHS Foundation Trust

Introduction: We describe a complex female patient with severe Overlap Syndrome (OHS and OSA) presenting with significant cardiometabolic repercussions.

Report of case(s): A 44-year-old non-smoking, female presented with morbid obesity (BMI 47.6kg/m²), poorly controlled resistant hypertension, chest pain, and dyspnea. Her initial workup showed a normal ECG and negative cardiac troponins. Her blood pressure upon admission was 260x127mmHg. Arterial blood gas analysis revealed respiratory acidosis with metabolic compensation: PCO₂=51 mmHg, HCO₃=33.4 mmHg, and SO₂=86%. Following emergency treatment, the mean arterial pressure was reduced by only 14.3%. Although her initial symptoms resolved

completely, she continued to experience worsening blood pressure and oxygen saturation values during sleep, in addition to headache when saturation remained between 91-95%. She was instructed to sleep in a seated position following this initial assessment. Further diagnostic investigation revealed a Hypoxic Burden (HB) of 878%.minutos/hora (considering the area under the curve of oxygen desaturation > 3%). Polysomnography (PSG) documented a total of 1011 respiratory events: 0 central and 1011 obstructive. The overall Apnea-Hypopnea Index (AHI) was 174.6/hour (141.8 apneas/hour and 32.8 hypopneas/hour). The REM AHI=152.7/hour. Baseline oxygen saturation was 98%; mean saturation was 69%, maximum was 98%, and minimum was a critical 41%. She spent 395.6 minutes (82.7% of the total sleep time) with SpO₂ < 90%, 258.5 minutes (54%) with SpO₂ < 80%, and 0.0 minutes (0.0%) with SpO₂ < 70%.

Conclusion: During the therapeutic segment, our patient was initiated on PAP at 15 cmH₂O. After just six weeks of treatment, follow-up revealed significant improvement, with the Hypoxic Burden reduced to 269%.minutos/hora and the Oxygen Desaturation Index (ODI) at 63. Despite being a critically ill patient, the combination of PAP therapy and multidisciplinary cardio-endocrinological monitoring led to a rapid improvement in her clinical status. The measurement of the Hypoxic Burden (HB), initially 878%.min/h, allowed for accurate monitoring as a clinical marker of impending life risk and cardiometabolic damage. The dramatic reduction of this parameter to 269%.min/h after only six weeks of PAP at 15 cmH₂O demonstrates that, for high-risk patients, PAP is a cardiovascular and metabolic rescue therapy, not merely a sleep disorder treatment.

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1306

WHEN ITCH MEETS APNEA: CONTINUOUS POSITIVE AIRWAY PRESSURE THERAPY RELIEVES CHRONIC PRURITUS IN SICKLE CELL DISEASE

Milan Patel, Stephanie Ashraf, Abhimanyu Reddy
Indiana School of Medicine

Introduction: Sickle cell disease (SCD) is a multisystem condition caused by a genetic mutation resulting in a wide range of clinical manifestations. Dermatologically, sickle cell disease has been associated with chronic pruritus, which can be particularly distressing and difficult to manage. This case highlights an unexpected therapeutic effect of continuous positive airway pressure (CPAP) therapy in alleviating long-standing pruritus in a patient with sickle cell disease.

Report of case(s): The patient is a 40-year-old male with a history of SCD who presented to the sleep clinic for evaluation of newly diagnosed severe obstructive sleep apnea (OSA). Sleep history was unremarkable aside from reported snoring. A home sleep study was obtained at the request of his pulmonologist, who sought to investigate potential contributors to his pulmonary hypertension. His apnea-hypopnea index was 53/hr, with oxygen saturation below 90% for 484 minutes. An in-lab titration study showed complete resolution of sleep disordered breathing with CPAP at 12 cmH₂O via nasal pillows, without supplemental oxygen, and he was started on these settings at home. At follow-up, he reported that the most notable improvement from CPAP was not sleep quality or alertness but complete resolution of chronic pruritus.

He described persistent, distressing itching for many years with multiple topical treatments having failed to provide relief. After just one night of CPAP use, he noted a significant reduction in pruritus, which was fully resolved within one week. This unexpected improvement became his primary motivation for strict adherence to therapy.

Conclusion: Resolution of pruritus with CPAP therapy is not well established in medical literature. Several theories suggest that improved tissue oxygenation, reduced sleep fragmentation, and decreased sympathetic tone may contribute to skin improvement. Furthermore, randomized controlled trials and meta-analyses have demonstrated that CPAP therapy can reduce inflammatory markers such as IL-6, TNF- α , and IL-8—some of which may play a role in pruritus. This case underscores the potential secondary benefits of CPAP therapy and highlights the importance of evaluating patients with sickle cell disease for undiagnosed sleep apnea, as early recognition of this relationship may meaningfully enhance patient outcomes.

Support (if any):

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1307

ADMINISTRATIVE DELAYS IN RE-INSTITUTION OF PAP THERAPY FOR SEVERE SLEEP APNEA MAY BE ASSOCIATED WITH NEW-ONSET ATRIAL FIBRILLATION

Sheila Rajan, Aarti Grover, Greg Schumaker, Rajesh Zacharias, Wei He, Joel Oster
Tufts University, Tufts Medical Center

Introduction: Central sleep apnea (CSA) produces cyclic changes in intrathoracic pressure, intermittent hypoxia, and heightened sympathetic activation, all of which may increase susceptibility to atrial arrhythmias. Adaptive servo-ventilation (ASV) stabilizes ventilation in CSA; however, insurance-related barriers often delay device replacement when machines malfunction. We describe the development of new-onset atrial fibrillation during a prolonged interruption of ASV therapy.

Report of case(s): A 79-year-old male with a past medical history significant for Wallenburg stroke complicated by complex sleep apnea requiring ASV, coronary artery disease, and asthma presented to the sleep medicine clinic in October with report of ASV device malfunction. He endorsed the return of snoring, witnessed apneas, and nonrestorative sleep. Despite a decade of documented benefit and adherence, his insurer required full requalification, including home sleep apnea testing (HST) and titration polysomnogram. HST demonstrated Apnea-Hypopnea Index of 48.3 events per hour and an Oxygen Desaturation Index of 49.2 events per hour. Oxygen nadir was 74% with 147.8 minutes spent with oxygen saturation less than 88%. A March titration polysomnogram confirmed ongoing central apnea and a continued need for ASV. His new device was ultimately dispensed in May. Delays in scheduling, authorization, and durable medical equipment processing resulted in months without therapy. Seven months into the untreated interval, he developed cough, congestion, fatigue, and palpitations. Evaluation by his primary care physician revealed new-onset atrial fibrillation, confirmed by electrocardiogram. He was started on anticoagulation and treated empirically for a respiratory infection.

Conclusion: There is emerging literature that moderate to severe sleep apnea may be associated with the development of cardiac

arrhythmias such as atrial fibrillation. Exactly which clinical factors may contribute to arrhythmia onset and how long sleep apnea must remain untreated or fail to be mitigated are unknown variables. This case identified a patient with both obstructive and central severe apnea who experienced administrative delays in seeking a new ASV machine due to it becoming nonfunctional. This patient experienced an approximate 8-month delay in obtaining an ASV device which may be associated with the development of atrial fibrillation. Streamlined replacement policies and insurance approval processes may help prevent avoidable therapy lapses and their downstream cardiorespiratory effects.

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1308

REFRACTORY RESIDUAL AHI WITH IMPROVEMENT ON A CUSTOM ORAL APPLIANCE ON BIPAP

Andy Vu, Ojaswi Ghimire, Kimberly Brown, Daniel Rongo
University of Texas at Tyler School of Medicine

Introduction: Obstructive sleep apnea (OSA) is well documented as a leading cause of chronic intermittent hypoxia and sleep fragmentation, contributing to increased morbidity and mortality. Positive airway pressure (PAP) remains the gold-standard treatment for moderate to severe OSA, whereas mandibular advancement devices (MADs) are typically reserved for mild to moderate disease or for patients who are unable to tolerate PAP. The combined use of PAP and MAD therapy, however, remains understudied. We present a case in which combination therapy was used to achieve further reduction in apnea burden.

Report of case(s): An 88-year-old man with severe OSA, class I obesity (BMI 33.1), and hypertension underwent diagnostic polysomnography in 2013 that demonstrated an apnea hypopnea index (AHI) of 12 events/hr, a respiratory disturbance index (RDI) of 37 events/hr, and an oxygen saturation nadir of 86%. Thus, BiPAP of 20/10 cmH₂O after a titration study was performed. Over the following years, despite interventions including adherence optimization, patient education, limiting of central nervous system depressants and weight loss. He persisted in having a residual AHI of 12.7 (AI 10.4, HI 2.3) of mostly obstructed events. Given his inability to tolerate BiPAP, a trial of a Biblock mandibular advancement device used concurrently with his therapy was initiated. After seven nights of combination MAD plus BiPAP at 20/10 cm H₂O, his AHI improved to 4.1 events/hr with notable symptomatic improvement.

Conclusion: This case highlights the potential benefit of combining MAD and PAP therapy to further reduce AHI and improve symptoms in select patients with OSA. While promising, long term data on combination therapy remain limited and further studies are needed to evaluate its efficacy. Current evidence suggests that MADs are most effective in patients with oral-anatomic phenotypes rather than nasal resistance phenotypes, with little difference between monoblock and titratable devices. Drug induced sleep endoscopy (DISE) has been proposed as a tool to directly assess sites of upper airway obstruction and guide therapy, but its role in identifying candidates for combination therapy is still evolving. Additional research is needed to develop clear criteria and phenotyping methods to identify patients who may derive optimal benefit from combined MAD-PAP therapy.

Support (if any):

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1309

POSITIONAL THERAPY AUGMENTED BY CONSUMER WEARABLE OXIMETRY FOR TREATMENT OF POSITIONAL OBSTRUCTIVE SLEEP APNEA: A CASE REPORT

Snigdha Ila¹, Ivan Escalona Puig², Emma Lipshultz², Eric Geil³, Hao Cheng³, Kori Ascher¹, Alexandre Abreu¹

¹University of Miami, ²University of Miami/Miami VA Medical Center, ³Miami VA Medical Center

Introduction: Positional obstructive sleep apnea (OSA) is defined by a disproportionate burden of respiratory events and nocturnal hypoxemia during supine sleep. Although positive airway pressure (PAP) therapy remains the gold standard for OSA, a significant subset of patient's decline or cannot tolerate PAP as a result of anxiety, discomfort, or interface related issues. Novel consumer wearable devices capable of monitoring nocturnal oxygenation and real time vibratory feedback during desaturation events may offer adjunctive, noninvasive approach to support behavioral interventions such as positional therapy.

Report of case(s): We report the case of a 40-year-old male with hypertension, chronic insomnia, mood disorder, and anxiety who presented with longstanding snoring and non-restorative sleep. A home sleep apnea test (HSAT) demonstrated severe OSA with an REI of 30.5 events/hour with nadir SpO₂ 76% and SpO₂ < 88% for 13 minutes with a supine and non-supine REI of 54.2 and 22.0. Patient was reluctant of PAP therapy and MAD and decided to be treated with positional therapy. The patient initiated strict positional therapy, including side-sleeping and head-of-bed elevation and independently adopted a consumer smart-ring oximeter that delivers vibratory feedback during oxygen desaturations, prompting positional changes. Over several months, he demonstrated excellent adherence, a 5-lb weight loss, and marked reduction in supine snoring corroborated by bed partner report, and improvement in daytime sleepiness (Epworth Sleepiness Scale decreased from 11 to 5). Repeat HSAT showed objective improvement in the overall REI which was reduced to 14.6 events/hour and supine sleep time reduced from 25% to 2 % of the total recording time.

Conclusion: This case suggests that positional therapy augmented by real time vibratory feedback from a consumer wearable oximeter may provide meaningful clinical benefit for select patients with positional OSA who decline PAP therapy. Although such devices are not FDA-approved, they may serve as a complementary tool within individualized, conservative OSA management strategies. Further studies are needed to evaluate accuracy, benefit and long-term outcomes.

Support (if any):

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1310

VIRTUAL SLEEP MEDICINE IN PRACTICE: LONG-TERM MANAGEMENT OF OSA THROUGH TELEHEALTH

Sabrina Seifert¹, Karolina Perez¹, Imran Patel², Salma Patel²

¹University of Arizona COM Tucson, ²University of Arizona

Introduction: Obstructive sleep apnea (OSA) is associated with increased cardiovascular morbidity and mortality. Standard management typically involves in-person diagnosis, PAP initiation, and follow-up, but many older adults experience fragmented care due

to mobility limitations, comorbidities, or transportation barriers. Telemedicine offers an alternative model that may improve continuity, access, and patient engagement. This case describes five years of virtual OSA management in an older adult with changing medical needs.

Report of case(s): An 82-year-old man with atrial fibrillation/flutter (status post multiple ablations and cardioversions), gastroesophageal reflux disease, hyperlipidemia, OSA, and insomnia was followed entirely through telemedicine. Home sleep apnea testing (HSAT) in 2020 revealed mild OSA (REI 12/hour, nadir SpO₂ 79%, 74 minutes < 88%). The patient declined CPAP and chose a mandibular advancement device (MAD). Telemedicine visits from 2020–2022 documented high adherence, symptom improvement, and reduced REI with the MAD. Repeat HSAT showed persistent hypoxemia not explained by residual apneas, prompting in-lab polysomnography (PSG). PSG with the MAD demonstrated REI ~9/hour without significant hypoxemia, supporting continued MAD therapy. Following influenza A pneumonia requiring ICU admission in 2023–2024, the patient experienced functional decline, recurrent atrial fibrillation, 26-lb weight loss, and new oxygen dependence. Because untreated OSA can exacerbate arrhythmia recurrence, repeat evaluation was pursued. In 2025, PSG with the MAD showed progression to severe OSA (REI 32.9/hour, nadir SpO₂ 83%, 24 minutes < 88%). A titration PSG was scheduled to assess supplemental alternative therapies.

Conclusion: This case illustrates how telehealth can support long-term OSA management in medically complex patients. Virtual care enabled timely reassessment, coordination with dental sleep medicine, and rapid adjustments during periods of clinical instability. Telemedicine was particularly useful for this elderly patient, who faced mobility challenges, hospitalizations, and comorbidities that made in-person visits difficult. Regular virtual follow-up promoted adherence, facilitated recognition of disease progression, and allowed treatment to be individualized over time. Telemedicine represents an effective model for continuous, patient-centered OSA care, especially for older adults and individuals with limited access to traditional sleep medicine services. This case highlights the value of virtual care in maintaining continuity, supporting multidisciplinary collaboration, and adapting therapy to evolving clinical needs.

Support (if any):

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1311

NOVEL CPAP AND INSPIRE TITRATION SLEEP STUDY APPROACH - IS TWO BETTER THAN ONE?

Kelvin Jens Moncera¹, Ryan Dunlow², Montserrat Diaz-Abad¹, Jennifer So¹

¹University of Maryland School of Medicine, ²University of Maryland, Baltimore

Introduction: Obstructive sleep apnea (OSA) is commonly treated with continuous positive airway pressure (CPAP) as first-line therapy, while hypoglossal nerve stimulation (Inspire) therapy serves as an alternative for patients intolerant of CPAP. This case report describes a novel comparative titration sleep study approach evaluating three treatment parameters in a single patient with OSA.

Report of case(s): A 72-year-old patient with severe OSA (baseline AHI 45.4 events/hr) with positional component, obesity (BMI 30 kg/m²), nocturnal hypoxia on nighttime supplemental oxygen

(nocturnal oxygen saturation 82%), anxiety on clonazepam, dream enactment behavior, and CPAP intolerance. Drug-induced sleep endoscopy showed only anterior and posterior pharyngeal collapse and Inspire device implantation was completed afterwards. Subsequent repeat diagnostic polysomnogram showed persistent severe OSA with concern for persistent nocturnal hypoxia. To identify therapeutic CPAP and Inspire setting parameters, an advanced titration sleep study was ordered under three conditions: Inspire monotherapy, combined Inspire with CPAP therapy, and CPAP monotherapy. Apnea-hypopnea index (AHI) served as the primary outcome measure for comparing treatment efficacy across modalities and oxygen saturation serving as a secondary outcome measure.

Conclusion: CPAP monotherapy demonstrated superior AHI reduction compared to both Inspire therapy alone and the combination of Inspire with CPAP therapies. Oxygenation and respiratory events improved on CPAP therapy (at 12 cm H₂O, AHI 9.6 events/hr and nocturnal oxygen saturation 89%). No therapeutic setting involving Inspire therapy was found to improve AHI as well as CPAP therapy despite changing electrode configurations, pulse width/frequency and voltage parameters. AHI was most reduced when hypoglossal nerve stimulator was off, consistent with established literature showing CPAP's effectiveness in reducing AHI in moderate-to-severe OSA. CPAP therapy, which delivers positive end-expiratory pressure (PEEP), alleviates OSA by maintaining positive pharyngeal pressure transmural pressure, thereby reducing AHI by preventing the repetitive upper airway collapse that characterizes the condition. When CPAP already maintains airway patency effectively, adding Inspire may provide no additional benefit. The combined therapy approach warrants further investigation to determine if specific patient populations might benefit from dual modality treatment. The medical literature does not report any studies specifically evaluating the combination of Inspire and CPAP therapies as a parameter of an overnight in-lab titration sleep study.

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1312

ONSET OF MANIA AFTER STARTING CPAP

Ibrahim Albawardi, Mai Malkin, Weam Sieffien, Kenya Costa-Dookhan, Lucas Robinson, Laura Rivera, Charles Choi, Tracy Sarmiento, Benoit Mulsant, Michael Mak
University of Toronto

Introduction: Bipolar affective disorder (BAD) is a mood disorder characterized by episodes of mania. It typically starts in late adolescence and early adulthood. However, 5–10% of bipolar patients will start having symptoms later in their lives. Obstructive sleep apnea (OSA) is characterised by repetitive upper airway collapse during sleep, causing intermittent hypoxia, sleep fragmentation and cardiovascular sequelae. In moderate to severe OSA, CPAP remains the gold standard treatment. In this report, we will present a case of a 43-year-old patient who had his first manic episode after 3 months of starting CPAP for OSA.

Report of case(s): Mr. R, a 43-year-old Man, presented to the emergency department with symptoms of euphoria, pressured speech, hyperactivity and grandiosity. He was admitted to the inpatient psychiatry ward and diagnosed with BAD Type 1, most recent episode manic. He has a family history of schizophrenia. Three months prior to admission, he had been diagnosed with sleep apnea. Collateral information indicates that the patient spoke of

increased restlessness, “making new epiphanies”, decreased need for sleep, having “superpowers of the mind” and being preoccupied with oxygen in the brain immediately after CPAP initiation and progressed in the weeks leading to admission. Substance use was only notable for 2-3 liquor shots weekly.

Conclusion: To our knowledge this is the 6th case report regarding CPAP-related mania. While our patient developed mania requiring admission after 3 months of CPAP, the previous cases reflected mania starting as early as 10 days after CPAP initiation. Another case described manic onset after 2 months. Other cases involved almost only men, aged at least 40 years. Patients with untreated bipolar disorder may experience shortened REM latency and prolonged REM sleep. In people with OSA, they may exhibit hypoxemia, and slow wave and REM sleep suppression due to frequent arousals. The potential REM rebound and increased oxygenation post-CPAP initiation is a putative mechanism of precipitating mania. Post-CPAP normalization of serum testosterone has been hypothesized as another cause. This report presents a case of an OSA patient who developed his first manic episode after starting CPAP. Further research is needed to better understand the pathophysiology of any such association.

Support (if any):

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1313

MARKED REDUCTION IN APNEA-HYPOPNEA INDEX AFTER HYPOGLOSSAL NERVE STIMULATION IN SEVERE OBSTRUCTIVE SLEEP APNEA: A CASE REPORT

Diwas Bam¹, Fadi Nassif²

¹Prisma Health/University of South Carolina School of Medicine Greenville (Seneca) Family Medicine Residency, ²Prisma Health/University of South Carolina School of Medicine Greenville

Introduction: Hypoglossal nerve stimulation (HNS) is an alternative treatment for obstructive sleep apnea (OSA) in patients who are unable to tolerate continuous positive airway pressure (CPAP). This case describes a patient with extremely severe OSA and a BMI slightly above typical eligibility cutoffs who experienced substantial improvement after HNS therapy.

Report of case(s): A 51-year-old man (BMI 35 kg/m²) was evaluated for long-standing loud snoring and marked daytime sleepiness. Home sleep apnea testing on 11/16/2022 showed very severe OSA with an apnea-hypopnea index (AHI) of 92.3 events/hour, oxygen saturation nadir of 74%, and 27.2% of total sleep time below 89% saturation. Several trials of auto-adjusting positive airway pressure (APAP) were unsuccessful because of pressure intolerance and mask discomfort. Drug-induced sleep endoscopy on 5/17/2024 revealed partial anteroposterior tongue-base collapse without concentric palatal collapse, supporting candidacy for HNS. The patient underwent HNS implantation on 11/12/2024, with device activation on 12/30/2024. Titration polysomnography on 7/22/2025 demonstrated a reduction in AHI to 6.9 events/hour at a stimulation amplitude of 2.6 V. The oxygen saturation nadir improved to 89%, with only 0.1% of sleep time below 89%. Sleep efficiency was 74.6%, REM sleep accounted for 8.7% of total sleep time, and the periodic limb movement index was 0. Mean nightly HNS use was 6 hours 56 minutes, with 100% adherence (>4

hours/night). The Epworth Sleepiness Scale score improved from 18 to 4, and both snoring and daytime sleepiness resolved. BMI remained stable (35→34 kg/m²). No perioperative complications occurred, and improvements persisted at 10-month follow-up.

Conclusion: This case highlights the sustained benefit of HNS in a patient with extreme OSA severity and a BMI above 34 kg/m². Careful DISE-guided selection and consistent device use resulted in marked physiologic and symptomatic improvement. This experience supports the real-world effectiveness of HNS for selected patients who fall slightly outside traditional BMI cutoffs.

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1314

CASE OF TRANSIENT HYPOVENTILATION AFTER HYPOGLOSSAL NERVE STIMULATOR IMPLANTATION

Michelle Yun, Kevin Kaplan
Baylor College of Medicine

Introduction: Down Syndrome is a chromosomal disorder with a high incidence of obstructive sleep apnea (OSA). Treatment of OSA in this population can be challenging due to limited surgical interventions and tolerance to positive airway pressure therapy. The use of hypoglossal nerve stimulation (HGNS) was recently approved for the treatment of OSA in pediatric patients with Down Syndrome 13 years of age and older. HGNS treats OSA by stimulating the hypoglossal nerve which leads to the contraction of the genioglossus muscle, reducing obstruction of the upper airway. Known adverse effects of HGNS therapy include discomfort from nerve stimulation, temporary weakness of the tongue, dry mouth, device malfunction, infection, and hematoma. This case report describes emergence of temporary hypoventilation in a patient with Down syndrome after HGNS implantation.

Report of case(s): Patient is a 19-year-old male with Down Syndrome, intellectual disability, hypothyroidism, allergic rhinitis, congenital heart disease, ADHD, scoliosis, and OSA. Treatment history for his OSA include use of supplemental oxygen, continuous positive airway pressure therapy (CPAP), and surgical interventions (adenotonsillectomy, laryngeal cleft closure, and a lingual tonsillectomy). Due to poor CPAP adherence, patient underwent HGNS implantation. Both the baseline polysomnogram (PSG) prior to implantation and activation PSG after implantation showed slightly elevated transcutaneous pCO₂ (TcCO₂) (maximum 56.2 mmHg) levels, without hypoventilation. Two months after activation a fine-tuning study showed resolution of OSA (AHI 3.7/hr) but with hypoventilation (TcCO₂ values greater than 50 mmHg for 37.3% of the total sleep time). This suggests that the hypoventilation began after implantation of the HGNS and was not caused by underlying OSA. The hypoventilation was confirmed with elevated serum bicarbonate levels (34). Repeat fine tuning PSGs show that the hypoventilation improved with time. 5 months post implant, the max TcCO₂ was 53.6 mmHg with levels > 50 mmHg for 21.6% TST. At 11 months post implant, max level was 51.7 mmHg with levels > 50 mmHg for only 2.6% of total time.

Conclusion: After HGNS implantation, our patient had temporary, self-resolving hypoventilation which was not associated with untreated obstructive sleep apnea.

Support (if any):

Abstract citation ID: zsag091.1314

1315

BENT BUT NOT BROKEN: HYPOGLOSSAL NERVE STIMULATION MALFUNCTION CAUSED BY SEVERE BENDING OF AN INTACT SENSING LEADKarthy Thiagarajan¹, Richard Byrne¹, Paul Covello²¹Geisinger Sleep Medicine, ²Geisinger Health System

Introduction: Hypoglossal nerve stimulation (HNS) provides an alternate treatment option for CPAP intolerant or non-adherent patients with moderate to severe obstructive sleep apnea. HNS is delivered via a stimulation lead placed around the hypoglossal nerve, an implanted pulse generator, and a respiratory sensing lead placed in the chest. While there have been reports of sensing lead malfunction due to migration of lead or tip fracture, we present a unique case of sensing lead malfunction caused by severe bending of the lead with an intact tip.

Report of case(s): A 64-year-old male with severe obstructive sleep apnea underwent HNS implantation due to dissatisfaction with CPAP therapy. Pre-procedure home sleep apnea test showed an AHI-4% of 37.7/hour. Post-operative course was uncomplicated. Initial waveform interrogation showed appropriate respiratory sensing. An HNS fine tune study showed only partial improvement of sleep apnea with stimulation-respiration dyssynchrony. Subsequent wave form analysis demonstrated a shark fin morphology. Waveform inversion was attempted, but an advanced fine tune study showed persistent respiratory events at different amplitude, electrode and timing settings. An awake endoscopy noted that mouth opening and neck flexion were associated with poor airway opening and use of a foam cervical collar was recommended. A home sleep apnea test at the recommended electrode settings with use of a foam cervical collar showed a treatment pAHI-4% of 40.5/hour. Due to persistently elevated AHI with aberrant respiratory sensing despite several setting adjustments, a revision of the sensing lead was pursued. Intraoperatively, the internal component of the sensing lead was noted to be severely bent with an intact lead tip. Following the sensing lead exchange, the shark fin waveform morphology resolved. A repeat home sleep apnea test showed improved treatment pAHI-4% of 13.1/hour.

Conclusion: A retrospective review of HNS related adverse events published in June 2024 noted that sensing lead malfunction included either lead migration or fracture. Our case highlights yet another cause of malfunction due to kinking of an intact sensing lead. It also demonstrates that HNS with non-physiologic shark-fin waveform may not be effective in improving sleep apnea despite recommended programming changes even with foam cervical collar.

Support (if any):

Abstract citation ID: zsag091.1315

1316

TREATMENT OF SEVERE OBSTRUCTIVE SLEEP APNEA WITH HYPOGLOSSAL NERVE STIMULATION UNMASKS UNDERLYING CENTRAL SLEEP APNEA AND CARDIAC CONDUCTION BLOCK

Sanjiti Podury, Stephanie Wappel

Greater Baltimore Medical Center

Introduction: Hypoglossal nerve stimulation (HGNS) is a safe and effective therapy for obstructive sleep apnea (OSA) in patients who are intolerant of positive airway pressure (PAP) therapy. HGNS does not address central sleep apnea (CSA), and patients with >25% central apneas are not considered HGNS candidates. Home sleep apnea testing (HSAT) is less reliable at diagnosing CSA, but there is no requirement to undergo in-lab polysomnogram (PSG) to determine candidacy for HGNS. We present a case of underlying CSA due to cardiac conduction block revealed during HGNS titration.

Report of case(s): 84-year-old male with severe OSA presented for consideration of HGNS due to persistent daytime sleepiness and PAP intolerance despite excellent PAP adherence. PAP download revealed residual apnea-hypopnea index (AHI) 12.9 with central apnea index (CAI) 7.4 and 18% Cheyne-Stokes Respiration (CSR). PAP settings were adjusted to temporarily reduce AHI as he underwent workup for HGNS. Diagnostic HSAT showed severe OSA with AHI 58.9 (CAI 1.2). Drug Induced Sleep Endoscopy did not show complete concentric collapse of the soft palate. HGNS was implanted. Patient tolerated therapy well with good adherence and subjective benefit. During follow up PSG, central apneas predominated prior to initiation of HGNS and during HGNS titration, yet appeared to resolve at amplitude of 2.3V. The patient underwent additional programming of HGNS, including awake endoscopy and advanced fine-tuning PSG, which confirmed adequate reduction of obstructive events with HGNS but persistent CSA/CSR. Cardiology evaluation revealed intermittent complete heart block with junctional escape rhythm. Cardiac events occurred primarily at night. The patient ultimately underwent dual chamber pacemaker implantation.

Conclusion: Effective treatment of OSA with HGNS can reveal clinically significant CSA and underlying occult cardiac conduction disease. CSA is often underdiagnosed, and PAP downloads may provide clues of more complex sleep disordered breathing in OSA patients who have comorbid CSA. This is a cautionary tale of the limitations of HSAT in detection of CSA and the importance of in-lab diagnostic PSG to determine appropriateness for HGNS. The case also highlights the importance of a multidisciplinary approach to treatment of sleep disordered breathing particularly in PAP intolerant patients.

Support (if any):

Abstract citation ID: zsag091.1316

1317

TREATMENT EMERGENT CENTRAL SLEEP APNEA FOLLOWING HYPOGLOSSAL NERVE STIMULATOR PLACEMENT FOR OBSTRUCTIVE SLEEP APNEA

Sultan Chhina, David Triplett, Amado Freire, Rabin Shrestha

University of Tennessee Health Sciences Center

Introduction: Treatment-emergent central sleep apnea (TECSA) is characterized by the presence of central events after resolution of obstructive sleep apnea (OSA) with therapy, typically positive airway pressure (PAP). TECSA with hypoglossal nerve stimulation (HGNS) is rare, with reported prevalence around 3.3% in cohort studies of non-PAP therapies such as surgery and dental mandibular advancements devices. Mechanisms may involve ventilatory instability, and it is often transient.

Report of case(s): A 62-year-old male with a medical history of anxiety, depression, gastroesophageal reflux disease (GERD),

obesity with BMI 27.3 and Severe OSA presented for management after CPAP intolerance. The patient reported no significant comorbidities like heart failure or opiate use that could explain alternative CSA etiologies, and physical exam was unremarkable. Baseline polysomnography (PSG) in 2019 showed an apnea-hypopnea index (AHI) of 31.3 events/h with no significant central sleep apnea. The patient underwent HGNS implantation combined with radiofrequency ablation (RFA) of lingual tonsils by otolaryngology in March 2025 followed by activation of device in April 2025 at an amplitude of 1.1 V. During the subsequent September 2025 HGNS titration PSG, the device was initiated at 1.6 V (0.2 V below the incoming amplitude of 1.8 V), revealing predominantly central events. The overall AHI was 53.9 events/h, with cAHI 30.52 events/h (suggestive of TECSA), and no REM sleep observed. Further titration up to 2.0V resulted in a residual AHI of 33 events/h.

Conclusion: This case highlights TECSA as a potential complication of HGNS for OSA, manifesting as a shift from obstructive to predominantly central events during titration, despite initial low central indices. TECSA's transient nature in many cases supports initial supportive management with close monitoring and setting adjustments to the lowest effective voltage for patient tolerance. For persistent or symptomatic TECSA, options include transitioning to bilevel PAP, acetazolamide to reduce loop gain, or arousal threshold-raising agents. Emerging approaches, such as concurrent phrenic nerve stimulation for dual neuromodulation, have shown promise in refractory cases. In-lab post-implantation titration is essential to detect TECSA, optimize therapy, and facilitate shared decision-making, balancing residual AHI with quality of life. Further studies are needed to establish HGNS-specific resolution rates and risk factors.

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1318

HYPOGLOSSAL NERVE STIMULATION LEAD WITH RECURRENT EXTRUSION

Abhimanyu Reddy¹, Stephanie Stahl², Milan Patel¹, Noah Parker², Arminster Johal¹

¹Indiana School of Medicine, ²Indiana University School of Medicine

Introduction: Hypoglossal nerve stimulation (HNS) is increasingly being utilized for treatment of obstructive sleep apnea (OSA) in patients with intolerance to positive airway pressure. One HNS device consists of an implanted pulse generator, a respiratory sensing lead, and stimulation lead. Lead migration, misalignment, and extrusion have been reported. We describe a case of recurrent stimulation lead extrusion.

Report of case(s): A 54-year-old man with severe OSA (apnea-hypopnea index 44.6/hour), shift work disorder, and hypertension underwent HNS implantation in March 2024. He had an uncomplicated post-operative course and HNS activation. He followed up with sleep medicine and was given instructions for continued amplitude adjustments. He did not follow up as scheduled, instead re-presenting in March 2025 for evaluation of progressive neck fullness to otolaryngology clinic. On physical examination, it was found that the stimulation lead was extruding 2-3 cm out of his neck without signs of infection. The following day, he had surgical revision, including freeing the lead wire and tucking it under the submandibular gland, suturing the gland over the wire, creating a sterno-hyoid flap and suturing that over the gland

and wire, closing of the platysma over the strap muscle flap, and closing the skin in multiple layers. Intraoperative testing indicated normal function. The patient presented for follow-up to sleep medicine six months post-revision with concerns of wire extruding out his neck again. Exam revealed a visible wire at his neck incision under a thin layer of skin without signs of infection. HNS was functioning, but review of data showed continued sporadic usage from the first day post-revision with titration just below his upper limit at 1.9V. He was referred back to otolaryngology for recurrent lead extrusion, and the device was subsequently explanted in October 2025.

Conclusion: HNS lead extrusion has been reported to be a rare complication. The reason for the recurrent lead extrusion was not known in this case but did not appear to be related to an infection. Management with lead revision, lead replacement, or HNS removal does not have robust data. However, if lead revision or replacement is chosen for management, the patient should be informed that recurrence is possible.

Support (if any):

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1319

A NOVEL MANDIBULAR ADVANCEMENT DEVICE WITH PALATAL ARCH SUPPORT (MADARCH) FOR TREATMENT OF OBSTRUCTIVE SLEEP APNEA (OSA)

Madhurima Gundlapally, Angela Awad, Hafiz Naeem, Divya Gupta
JFK University Medical Center

Introduction: We report a case of refractory severe OSA with submucosal cleft palate who responded to our novel MADArch device, patent pending. This appliance may be an option for patients who are not candidates for conventional MAD for example edentulous patients, or who are not responsive to it for example submucosal cleft palate.

Report of case(s): A 68-year-old man with elevated Epworth's sleepiness scale (ESS) of 12/24 and severe OSA with apnea hypopnea index (AHI) of 74/hour was placed on PAP therapy. Initially, there was improvement of AHI to 3.4/hour, ESS to 5/24 (normal), but mask leak was high at 40.2L/min. After adding a conventional MAD for retrognathia, his mask leak improved. However, his ESS and residual AHI gradually increased again. Interestingly, his residual AHI was higher (37.7/hour) when using PAP therapy with the conventional MAD, rather than without it (AHI 6.7/hour). A PAP titration study with the conventional MAD showed severe residual OSA on maximal BiPAP ST (30/25 @ 12 bpm). CT chest showed no intrathoracic obstruction to explain the relapse of his OSA despite maximal PAP therapy and MAD. Drug-induced sleep endoscopy (DISE) revealed he had a bifid uvula with marked velopharyngeal collapse and invagination of the hard palate that rendered him ineligible for hypoglossal neurostimulator therapy, or even palatoplasty. CT sinuses confirmed a submucosal cleft palate. Of note, the patient was not interested in a tracheostomy to correct his OSA. The sleep provider devised a novel MAD featuring a palatal arch support (MADArch) and requested the patient's oral and maxillofacial surgeon (OMFS) to create it. Using MADArch with BiPAP ST, normalized the patient's AHI to 3.4/hour, and his ESS to 5/24.

Conclusion: This case highlights the efficacy of our novel MADArch appliance over conventional MAD in treating residual OSA in patients with extreme velopharyngeal collapsibility, due

to conditions such as submucosal cleft palate, by providing structural support to the hard palate. Such innovations may offer viable alternatives to patients with complex palatal anatomy who are not surgical candidates or who prefer non-invasive treatment.

Support (if any):

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1320

MANAGEMENT OF CO-MORBID INSOMNIA AND OBSTRUCTIVE SLEEP APNEA WITH HYPOGLOSSAL NERVE STIMULATOR

Naomi Ghildiyal¹, Mercy Azubuko-Udah², James Hall², Alok Pant¹, Minh Tam Ho¹, Malti Bhamrah², Cesar Liendo¹, Oleg Chernyshev³

¹Ochsner LSU Health Medical Center, ²Louisiana State University Shreveport, ³LSU Health Sciences Center at Shreveport

Introduction: Hypoglossal nerve stimulation should be considered in carefully selected OSA patients who remain PAP intolerant, particularly when comorbid insomnia complicates management.

Report of case(s): Patient is a 65-year-old Caucasian Male with Congenital facial deformity (right side), HTN, HLD, allergic rhinitis, GERD, BPH, Nicotine dependence, insomnia, essential tremors, microvascular disease and chronic headaches. The patient was initially seen in the Sleep Medicine Clinic with complaints of symptoms suggestive of OSA (witnessed apneas, choking in sleep, EDS, fatigue, non-restorative sleep, unsure of snoring) for the last several years prior to the visit and was being treated by his PCP for "Insomnia" with eszopiclone 3 mg (2015) and he was self-medicating with 3 tabs of Equate PM OTC. His primary reason for seeking consultation was to increase the dose of eszopiclone to 5 mg. No previous sleep studies were available for him. PSG completed in February 2024 showed AHI 22.6/hour, Oxygen nadir 71%, and he was started on APAP 6-16 cm H₂O. Patient declined starting PAP therapy due to preferring to sleep on his back and concerns regarding his allergic rhinitis. A titration study was completed, and APAP 6-12 cm H₂O was ordered. He eventually became intolerant to APAP, and he was evaluated for HGNS and implanted in March 2025. Clinic visit on September 2025, the patient reported significantly improved sleep quality, restorative and consolidated sleep. Inspire compliance data revealed consistent device use averaging 59 hours per week. The patient noted improved daytime functioning with decreased insomnia complaints. The patient used eszopiclone only on a as needed basis and stopped using OTC Equate PM.

Conclusion: Insomnia is often both a consequence of untreated OSA and an independent contributor to poor sleep and quality of life. The hypoglossal nerve stimulator represented an effective alternative, leading to improved sleep outcomes, reduced insomnia severity, and strong adherence.

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1321

UNRAVELING THE MYSTERY: THREE CASES OF ACQUIRED CENTRAL HYPOVENTILATION SYNDROME

Nora Bismar, Muhammad Abu-Rmaleh, Bethany Lussier, Won Lee
UT Southwestern Medical Center

Introduction: Central hypoventilation syndrome (CHS), also known as Ondine's curse, is a rare disorder in which alveolar hypoventilation occurs due to failure in autonomic control of ventilation while voluntary control remains intact. Acquired CHS is usually caused by injury to the medulla oblongata and pons either via trauma, stroke, hypoxia, tumors, encephalitis, or neurodegenerative conditions. In acquired cases, the presentations differ depending on the degree and location of damage to the central respiratory centers. We present three cases of acquired CHS and review management as it differs from congenital causes.

Report of case(s): A 55-year-old female with heart failure, coronary artery disease, type 2 diabetes, and prior stroke with residual left-sided deficit, presented with symptomatic occlusion of the left V4 segment of the vertebral artery leading to ischemic stroke involving the dorsal left medulla. She was intubated for airway protection and acute hypoxia in the setting of aspiration. Following successful extubation, she suffered a cardiac arrest precipitated by hypoxia associated with prolonged apnea. Subsequent MRI demonstrated evolution of prior stroke. Spontaneous breathing trials were aborted due to recurrent apneas, and she underwent a tracheostomy to facilitate long-term mechanical ventilation. A 66-year-old male presented with progressive gait disturbance and dysarthria from a pontomedullary cavernoma and required surgical resection after failed conservative management. Following surgery, he developed CHS, with several complications including chronic hypoxic and hypercapnic respiratory failure, cardiopulmonary arrests, autonomic dysfunction, and recurrent infections. He failed a therapeutic trial of stimulants, underwent a tracheostomy, was discharged home with near continuous mechanical ventilation, and was referred for consideration of phrenic nerve pacing. A 76-year-old male presented with late-onset CHS and bulbar weakness, which led to respiratory failure and the placement of a tracheostomy. Recurrent prolonged apneas prevented weaning from invasive ventilation, ultimately resulting in a diagnosis of Parkinson's disease with rare neurodegenerative involvement of the brainstem. He is maintained on nocturnal invasive mechanical ventilation.

Conclusion: We review these cases of acquired CHS and the management considerations. Current literature supports trials of stimulants or consideration of phrenic pacing as an adjunct to mechanical ventilator support, but comorbid bulbar and autonomic dysfunction limits application of guidance in acquired cases.

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1322

RESOLUTION OF CENTRAL SLEEP APNEA AND CHEYNE-STOKES BREATHING FOLLOWING PACEMAKER IMPLANTATION FOR ATRIOVENTRICULAR BLOCK

Rupan Deep Kaur¹, Kushaghar Singla², Maithily Patel¹,
Kassandra Olgers³, Vinita Vaidya³, Sreekartthik Athiyaman⁴,
Sunil Sharma⁵

¹WVU Wheeling Hospital, ²Hospital of the University of Pennsylvania, ³WVU Medicine Ruby Memorial Hospital, ⁴New York Medical College, St. Mary's and St. Clare's Health, ⁵West Virginia University

Introduction: Central sleep apnea with Cheyne Stokes breathing may appear in patients with cardiac conduction disease when

severe bradyarrhythmia prolongs circulatory time and destabilizes ventilatory control. In such cases, positive airway pressure therapy may not resolve central events because the underlying mechanism is impaired cardiac rhythm rather. This report describes a patient with long-standing obstructive sleep apnea who developed new central sleep apnea due to progressive atrioventricular block, with marked improvement after pacemaker implantation.

Report of case(s): A 77 year old man with obstructive sleep apnea had been highly adherent to continuous positive airway pressure since before 2015. He previously demonstrated excellent control, with a residual apnea hypopnea index of 6.4 per hour on 8 cm H₂O, and an August 2022 titration showed complete elimination of events at 10 cm H₂O with no central apneas. His Epworth Sleepiness Scale was 3. In 2023, he developed weight gain, lower extremity edema, and progressive bradycardia. Continuous positive airway pressure downloads revealed rising central events, Cheyne Stokes breathing exceeding three hours nightly, and a residual apnea hypopnea index of 25.1 per hour. Obstructive events remained minimal, supporting combined obstructive and central sleep apnea rather than treatment emergent central sleep apnea. He declined retitration or advanced positive airway pressure therapy. Echocardiograms from 2022 to 2024 consistently showed preserved systolic function with ejection fraction. Holter monitoring demonstrated progressive conduction disease including Wenckebach pattern, 2:1 atrioventricular block, bifascicular block, and episodes concerning for complete heart block. A dual chamber rate responsive pacemaker with left bundle branch pacing lead (DDDR 60 to 120 bpm) was implanted on October 30, 2024. Within one month, continuous positive airway pressure data showed improvement. The apnea hypopnea index decreased to 10.7 per hour, Cheyne Stokes breathing reduced to one hour and thirty minutes, and his Epworth Sleepiness Scale improved to 0. He reported restored sleep quality without changes in continuous positive airway pressure settings.

Conclusion: This case shows that central sleep apnea and Cheyne Stokes breathing caused by bradyarrhythmia may improve after correction of atrioventricular block with dual chamber pacing. Continuous positive airway pressure data were crucial in revealing the cardiac etiology.

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1323

BEYOND ATRIAL FIBRILLATION AND HEART FAILURE: CENTRAL SLEEP APNEA AS A MARKER OF OCCULT ATRIOVENTRICULAR CONDUCTION DISEASE

Blessen George, Anant Shukla, Lauren Tobias
Yale School of Medicine

Introduction: Central sleep apnea (CSA) results from ventilatory instability driven by heightened chemoreflex sensitivity and prolonged circulation time. Well-recognized contributors include atrial fibrillation (AF) and heart failure (HF), where rhythm disturbance, impaired contractility, and fluctuations in cardiac output increase loop gain and promote central events. In contrast, cardiac conduction disease is an underrecognized contributor to the development of central apnea. We describe a case in which new central apneas emerging during long-standing continuous positive airway pressure therapy (CPAP) led to the diagnosis of

high-grade atrioventricular (AV) block, with subsequent improvement in CSA after dual-chamber pacemaker implantation (PPM).

Report of case(s): A 79-year-old man with obstructive sleep apnea well controlled for years on CPAP and a prior myocardial infarction with stents presented for routine follow-up. CPAP downloads showed a new residual AHI of 15.2/hr with a predominantly central pattern despite stable pressures, minimal leak, and excellent adherence. Ambulatory ECG monitoring performed after ruling out other common etiologies of CSA demonstrated high-grade AV conduction disease, including 3:1 block, progressive PR prolongation, nocturnal pauses up to 5.2 seconds, and intermittent Mobitz I and II events. A PPM was implanted after an electrophysiology evaluation. Repeat CPAP download within 30 days post-PPM insertion showed marked improvement, with the residual AHI falling to 7.1/hr without changes to medications, sleep habits, or pressure settings. Rhythm control in AF improves CSA by stabilizing cardiac output and circulatory timing. Optimization of HF therapy similarly reduces loop gain by improving stroke volume and relieving pulmonary congestion. Chronotropic impairment and AV conduction disturbances, however, are less appreciated contributors. Intermittent high-grade block reduces cardiac output and prolongs circulation time, destabilizing ventilatory control and promoting respiratory overshoot and undershoot. These pauses weaken circulatory feedback and amplify chemoreflex oscillations that trigger central events. Restoration of AV synchrony through PPM appears to correct this instability.

Conclusion: PPM for high-grade AV block resulted in a significant improvement in CSA burden. Newly developed central apneas in a previously stable CPAP user should prompt evaluation for occult conduction disease alongside other causes such as AF, HF, cerebrovascular disease, opioid use, high-altitude exposure, and medication effects.

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1324

RECOGNIZING CENTRAL SLEEP APNEA IN THE SETTING OF HEART FAILURE WITH BIOPROSTHETIC AORTIC VALVE

Peter Huh, Hira Bakhtiar
Norwalk Hospital

Introduction: Central sleep apnea (CSA) and Cheyne–Stokes respiration (CSR) frequently occur in patients with heart failure, atrial fibrillation, and low cardiac output states. However, severe CSA associated with progressive dysfunction of a bioprosthetic aortic valve is less commonly recognized. We present a case of profound CSA in the setting of worsening central aortic regurgitation and heart failure physiology.

Report of case(s): A 72-year-old man with ischemic cardiomyopathy (prior EF 40%), bioprosthetic aortic and mitral valves, redo aortic valve replacement for endocarditis, atrial fibrillation on anticoagulation, multiple prior strokes, vascular dementia, coronary artery disease, hypertension, diabetes, and extensive comorbidities presented with one month of worsening fatigue, fluctuating alertness, and erratic breathing patterns. His Epworth Sleepiness Scale was 13. Family and inpatient teams reported episodes consistent with CSR, though none were directly observed during examination. He denied habitual snoring. Laboratory studies showed hemoglobin 11 g/dL, creatinine 1.5 mg/dL, proBNP >18,000 pg/mL, and serum bicarbonate 20–21 mmol/L.

Infectious and metabolic evaluations were negative. Brain MRI demonstrated chronic infarcts. CT chest showed a dilated pulmonary artery, small effusions, and contrast reflux into the IVC and hepatic veins, suggesting elevated right-sided pressures. Echocardiography in August 2025 revealed EF 55% with wall motion abnormalities and moderate to severe aortic regurgitation across a bioprosthetic valve. Repeat echocardiography in October demonstrated mild systolic dysfunction, severe apical hypokinesis, moderate-to-severe central aortic regurgitation, mild paravalvular leak, diastolic flow reversal in the descending aorta, mild mitral regurgitation, moderate tricuspid regurgitation, and a moderately dilated left atrium. Due to concern for CSA, a diagnostic polysomnogram was performed on 10/8/2025, revealing severe central sleep apnea with total sleep time 85.7 minutes, AHI 82.6/hr, central apnea index 74.2/hr, oxygen nadir 78%, and persistent atrial fibrillation. No significant periodic limb movements were seen. A PAP titration study was scheduled.

Conclusion: This case highlights severe CSA occurring concurrently with worsening bioprosthetic aortic regurgitation and heart failure physiology. Elevated filling pressures, atrial fibrillation, impaired forward flow, and increased loop gain likely contributed to ventilatory instability. Recognition of CSA in valvular deterioration is important, as optimization of cardiac function may significantly improve respiratory patterns and clinical outcomes.

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1325

SEVERE CENTRAL SLEEP APNEA AND SLEEP-RELATED HYPOVENTILATION IN A PATIENT ON BUPRENORPHINE/NALOXONE

Crystal Cassimere, Donald Bliwise
Emory University

Introduction: Opioid substitution therapy (OST) is a recognized risk factor for central sleep apnea (CSA) and sleep-related hypoventilation. While methadone has been strongly associated with severe sleep-disordered breathing, buprenorphine is often regarded as a safer alternative. However, the impact of dosing timing and residual ventilatory impairment remains incompletely understood.

Report of case(s): A 49-year-old male with opioid use disorder in sustained remission on buprenorphine/naloxone presented with excessive daytime sleepiness and self-initiated CPAP use without prior diagnostic testing. Polysomnography demonstrated severe mixed sleep-disordered breathing with predominant central apneas, nocturnal bradypnea, and hypercapnia. PAP titration revealed CPAP failure due to the emergence of central apneas, with partial improvement on BiPAP-ST.

Conclusion: While evening methadone dosing has been associated with increased sleep-disordered breathing and no significant correlation between buprenorphine dose and AHI in prior studies, data specific to buprenorphine dosing and timing remain limited. This case highlights that while buprenorphine may reduce CSA severity compared to full opioid agonists, clinically significant central apnea and hypoventilation may persist, potentially influenced by dosing timing and impaired chemosensitivity.

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1326

SILENT HYPERCAPNIA: IDENTIFYING IDIOPATHIC CENTRAL ALVEOLAR HYPOVENTILATION AMID MILD OBSTRUCTIVE SLEEP APNEA

Misbah Hassan, Andre Aguillon

The University of Toledo College of Medicine and Life Sciences

Introduction: Central Alveolar Hypoventilation Disorders are defined by inadequate ventilation during sleep, leading to elevated arterial carbon dioxide levels and reduced oxygenation despite structurally normal lungs and airways. Idiopathic central alveolar hypoventilation occurs in absence of pulmonary or neurologic disease, chest wall abnormalities, obesity, medication effects, or congenital hypoventilation syndromes.

Report of case(s): 36-year-old male was referred to Sleep Medicine for elevated serum bicarbonate level (32 mmol/L) and respiratory acidosis on venous blood gas (pH 7.28, pCO₂ 63, HCO₃ 29) following Nephrology evaluation for foamy urine. Diagnostic polysomnography showed mild obstructive sleep apnea (AHI=7.2 events/hour, Nadir SpO₂=90%) and elevated maximum transcutaneous PCO₂ (TcCO₂) level of 59.4 mmHg. BMI=22.8 kg/m² without history of cyanosis, developmental delay, or respiratory failure following anesthesia for colonoscopy. The patient returned for in-lab continuous positive airway pressure (CPAP) titration study, which demonstrated persistent nocturnal hypoventilation with baseline awake TcCO₂=41 mmHg and maximum TcCO₂=55.9 mmHg with TcCO₂ ≥ 55 mmHg for at least 10 minutes, despite normalization of oxygen saturation with CPAP. A comprehensive evaluation for hypoventilation revealed normal pulmonary function tests, brain MRI/MRA without structural or vascular abnormalities, and cardiopulmonary exercise testing (CPET) with a normal anaerobic threshold. Echocardiography showed normal systolic and diastolic function without pulmonary hypertension. There was unremarkable chest imaging, no endocrine abnormalities, and no use of respiratory-depressant medications. Patient underwent a Bilevel PAP (BPAP) titration study which resulted in normalization of TcCO₂ levels during sleep (Baseline TcCO₂=39 mmHg, Maximum TcCO₂=40.5 mmHg) with normal oxygen saturations. The patient was initiated on BPAP 9/5 cmH₂O for management of sleep-related hypoventilation. PHOX2B genetic testing was ordered but not completed due to cost.

Conclusion: This case highlights the importance of considering Idiopathic Central Alveolar Hypoventilation in adult patients with unexplained respiratory acidosis and nocturnal hypercapnia despite treatment of obstructive sleep apnea and in the absence of obesity, medication effect, cardiopulmonary, neurological, neuromuscular, chest wall or endocrine disorders following comprehensive diagnostic assessment. The patient's response to BPAP therapy shows effectiveness of noninvasive ventilation in correcting the sleep-related hypoventilation. Although testing for PHOX2B gene mutation may be considered, timely initiation of appropriate therapy and close monitoring nevertheless remain essential.

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1327

RESOLUTION OF CENTRAL SLEEP APNEA IN A PATIENT WITH A CHIARI 1 MALFORMATION FOLLOWING SURGICAL DECOMPRESSIONNamrata Damle¹, Conrad Iber²¹Hennepin Healthcare (HCMC), ²University of Minnesota

Introduction: Central respiratory events, including hypoventilation and apneas, are caused by compression of the brainstem in Type 1 Chiari malformations (CM1). Central sleep apnea (CSA) occurs in 15-34% of children with CM1, and compensated central hypoventilation is present in 15%. Other potential complications of CM1 include nystagmus, headaches, and, in rare and devastating cases, a risk of sudden unexpected nocturnal death. We describe a case of an adolescent with CSA due to CM1 that improved with surgical decompression.

Report of case(s): A 17-year-old female with a history of ADHD presented to Sleep Medicine clinic with daytime fatigue and brain-fog. No significant snoring was noted, and she had an Epworth sleepiness scale (ESS) score of 16. The initial home sleep test had a central apnea-hypopnea index (AHI) of 21 and an obstructive AHI of 6.5. Subsequent polysomnography (PSG) showed predominantly central sleep apnea with a combined AHI of 42.6 (central AHI 41.6), and the patient was managed on Bilevel ST 12/6 RR 10. She had modest improvement in her daytime symptoms. As she had no history of underlying central nervous system pathology, her CSA was initially presumed to be idiopathic. However, 2 years later, she developed recurrent debilitating headaches and downbeat nystagmus, so an MRI of the head was completed. This showed CM1 with tonsils 32 mm below the foramen magnum; therefore, surgical decompression was performed via craniectomy and C1 arch removal with duraplasty. Postoperatively, the patient had reduction of headaches and nystagmus and denied daytime fatigue without the use of Bilevel PAP therapy, and ESS was reduced to 8. Subsequent PSG showed no significant sleep apnea with the combined AHI of 4 events/hr (central AHI of 3.2 events/hr) without any PAP therapy. She was able to discontinue use of Bilevel therapy and continued to feel improvement in her fatigue.

Conclusion: This case demonstrates that in an otherwise healthy adolescent patient with unexplained central sleep apnea, a type 1 Chiari Malformation could be a profound cause that should be considered during evaluation. Surgical decompression can improve associated symptoms and significantly improve central sleep apnea to the extent that the patient may not need continued PAP therapy.

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1328

THE TEMPORARY ROLE OF NEGATIVE PRESSURE VENTILATION IN AN ADOLESCENT WITH CONGENITAL CENTRAL HYPOVENTILATION SYNDROMEAmanda Dobbins¹, Rohan Bellary², Michael Orangias², Ronald Morton¹, Sara Weathers³, Sarah Khayat¹, Egambaram Senthilvel²¹University of Louisville, ²University of Louisville School of Medicine, ³Norton Healthcare

Introduction: The aim of this case report is to describe the role of negative pressure ventilation as temporary ventilatory support while an adolescent is undergoing nasal surgery.

Report of case(s): A 17-year-old male with genetically confirmed heterozygous PHOX2B mutation with congenital central hypoventilation syndrome (CCHS). Hypoventilation was initially managed with tracheostomy and continuous ventilation from birth to age nine, followed by noninvasive AVAPS therapy (IPAP 10–20 cm H₂O, EPAP 6, backup rate 16) during sleep alone. Most recent baseline polysomnography at age 10 showed AHI 11.3, OHI 10.3, SpO₂ nadir 83%, mean SpO₂ 93%, peak CO₂ 71 mmHg, mean CO₂ 63 mmHg, 100% of total sleep time with CO₂ > 50 mmHg. During adolescence, he developed nasal obstruction and deformity from sports trauma along in conjunction with long-term nasal-mask use. Otolaryngologic evaluation revealed a C-shaped external nasal and septal deformities obstructing the entire left nostril, and septorhinoplasty was recommended. Because interfaces could not be safely used perioperatively, ventilatory strategies were reviewed by a multidisciplinary team, and negative-pressure ventilation (NPV) with Hayek biphasic cuirass was chosen as the optimal therapy. A titration study in February 2024 demonstrated effective ventilatory control with NPV (settings of -22/8 with back up rate of 16 breathe per minute with 1:1 sync and trigger of 8). NPV was initiated one week before surgery and continued for three months postoperatively. He was monitored in the PICU during the immediate perioperative period given his complex respiratory history and initiation of NPV. After three months of stable use and full recovery from septorhinoplasty, he transitioned back to AVAPS therapy. This case illustrates successful perioperative use of biphasic cuirass ventilation in a CCHS patient unable to use nasal interfaces with non-invasive ventilation (NIV), highlighting its utility as a safe and effective temporary ventilatory option during facial surgery or situations where conventional noninvasive support is not feasible.

Conclusion: Despite multiple modes of therapy available, interfaces can markedly affect utilization during septorhinoplasty. Our case shows that NPV can be considered for temporary ventilation management during upper airway surgery in adolescents with CCHS when normal interfaces are contraindicated.

Support (if any):

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1329

UNIQUE PRESENTATION AND COMPLICATIONS IN A PATIENT WITH CONGENITAL CENTRAL HYPOVENTILATION SYNDROME (CCHS)

Sheryl Johnson, Jon Maniaci

Children's Hospital of Philadelphia

Introduction: Congenital central hypoventilation syndrome (CCHS) is a rare disorder characterized by alveolar hypoventilation and autonomic dysregulation. This case highlights the importance of obtaining a detailed family history and ensuring adherence to ventilatory support for accurate diagnosis and effective management.

Report of case(s): A 13-month-old female with no known medical history was transferred from an outside hospital for management of acute hypoxemic respiratory failure secondary to RSV. At time of transfer, she was treated with 2.5 LPM of supplemental oxygen. Upon admission, she developed progressive hypoxemia, bradypnea and lethargy. Despite escalating supplemental oxygen,

hypoxemia worsened, necessitating a code response. Venous blood gas showed pH 7.11, $p\text{CO}_2 > 95$ mmHg. She was intubated and transferred to the PICU. She was extubated to BLPAP on hospital day two but continued to demonstrate hypercapnia when attempts were made to wean support. Her father was at bedside but was frequently difficult to arouse, prompting initial concern for drug abuse. However, further family history revealed her father had been diagnosed with CCHS at 16 months and required a tracheostomy until 15 years of age. He was currently prescribed BLPAP but had poor compliance. With increased concern for CCHS, baseline polysomnogram was obtained and demonstrated persistent hypercapnia with minimal heart-rate variability. Genetic testing revealed PHOX2B 20/25 PARM expansion, confirming the diagnosis of CCHS. The patient was treated with BLPAP to be used during sleep. She was discharged to live with mom and maternal grandmother after they received extensive training. Six months later, the patient was readmitted due to respiratory distress and altered mental status, found to be in acute on chronic hypercapnic respiratory failure in the setting of rhinovirus and poor BLPAP adherence. Hospital course was complicated by ARDS and ventilator-associated pneumonia. A tracheostomy was placed to facilitate increased ventilatory support and concerns regarding her medical care at home. She was ultimately discharged to a long-term care facility with subspecialty follow-up.

Conclusion: Unexplained hypercapnia in children during sleep warrants evaluation with detailed family history, polysomnography, and genetic testing. CCHS, though rare, can lead to life-threatening respiratory failure without adequate ventilatory support, requiring consistent caregiver attention and involvement.

Support (if any):

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1330

RECURRENT LOSS OF CONSCIOUSNESS IN A PATIENT WITH NARCOLEPSY AND OSA: A HIDDEN UNDERLYING ETIOLOGY OF CHRONIC HYPOVENTILATION

Samiksha Gupta¹, John Carter²

¹Case Western University Hospitals, ²MetroHealth Medical Center

Introduction: Narcolepsy-like features have been reported in patients with myotonic dystrophy, particularly type 1 (DM1), but true narcolepsy is rare. Sodium oxybate, while effective for narcolepsy with cataplexy, is known to cause hypoventilation and central apneas, with risk heightened in patients with neuromuscular weakness or pre-existing ventilatory compromise. We present a case of recurrent loss-of-consciousness episodes in a patient with established narcolepsy and OSA, ultimately revealing significant nocturnal hypoventilation and raising diagnostic uncertainty about whether his symptoms were due to oxybate therapy or underlying neuromuscular disease.

Report of case(s): 41-year-old man with a history of previously diagnosed narcolepsy and OSA (AHI 15) presented after five episodes of altered consciousness over one year. Extensive cardiac and neurologic evaluations conducted during hospital admissions were unrevealing, except for consistently elevated serum bicarbonate (31–33 mEq/L) and hypercapnia (PCO_2 52–57 mmHg). He had longstanding EDS beginning in young adulthood, with diagnosis of narcolepsy confirmed on PSG/MSLT. He was treated with multiple stimulants before initiation of sodium oxybate (Xyrem),

which improved daytime alertness. Following two hospitalizations for loss of consciousness with documented apneas and hypercapnia, inpatient BiPAP (14/10 cm H₂O) was initiated. Post-discharge polysomnography on Xyrem showed moderate OSA (AHI 23.5) and persistent nocturnal hypoventilation with CO_2 levels 50–56 mmHg. After discontinuing Xyrem, repeat PSG demonstrated marked improvement in OSA (AHI 2.4) but persistent nocturnal hypercapnia (55–58 mmHg). Pulmonary function testing revealed normal spirometry but reduced MIP (55%) and MEP (21%), with normal supine FVC drop (7%), suggesting effort-related limitation rather than clear neuromuscular weakness. He remained off oxybates, started solriamfetol with partial improvement, and experienced no further LOC events. Neurologic exam revealed subtle grip percussion myotonia, prompting genetic testing for myotonic dystrophy type 1 (DM1). Genetic testing for DM1 was positive. Over subsequent months he experienced psychiatric decompensation unrelated to sleep events but later achieved clinical stability with normalization of Epworth Sleepiness Scale (ESS 5).

Conclusion: Myotonic dystrophy type 1 (DM1) is associated with narcolepsy-like features, including excessive daytime sleepiness (EDS), sleep-onset REM periods, and REM sleep dysregulation, which can mimic narcolepsy. Caution is advised when prescribing oxybate in neuromuscular disease, and polysomnographic monitoring is recommended to detect respiratory complications.

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1331

A CASE OF EBSTEIN ANOMALY PRESENTING WITH CENTRAL SLEEP APNEA

Hollyann Loui, Armand Ryden

UCLA

Introduction: Ebstein anomaly is a rare congenital malformation of the tricuspid valve and right ventricle, characterized by apical displacement of the septal and posterior tricuspid leaflets. This results in atrialization of part of the right ventricle and may cause significant tricuspid regurgitation. Associated findings frequently include an atrial septal defect or patent foramen ovale, which may cause right-to-left shunting and cyanosis. Clinical presentation is highly variable: ranging from severe cyanosis and heart failure in neonates to asymptomatic adults.

Report of case(s): A 67-year-old-man with history of Factor V Leiden and deep venous thromboembolisms was referred to Sleep clinic for complaints of insomnia. His Epworth Sleepiness Scale was 1. His Insomnia Severity Index was 22. Polysomnogram demonstrated central sleep apnea (CSA) with an apnea-hypopnea index of 21/hr. As part of the evaluation for his CSA, he underwent a cardiac evaluation. Echocardiogram showed a possible right ventricular apical mass. Subsequent cardiac MRI imaging revealed apical displacement of the septal leaflet of the tricuspid valve, morphologically consistent with an Ebstein anomaly, from which he had remained asymptomatic throughout his life. He underwent a CPAP titration and was prescribed CPAP 7cm H₂O; however, he was unable to tolerate CPAP therapy and ultimately lost to follow-up.

Conclusion: Ebstein anomaly is the most common congenital tricuspid valve abnormality, but remains rare, accounting for less than 1% of congenital heart defects. To our knowledge this is the first case report describing central sleep apnea in a patient with Ebstein anomaly. CSA is most frequently associated with cardiovascular conditions like heart failure and atrial fibrillation,

and neurological conditions including stroke, brainstem lesions, and chronic opioid use. CSA is prevalent in adults with congenital heart disease. In addition to ventilatory instability, impaired cardiac output, and altered chemoreflex sensitivity that are seen in the setting of ventricular dysfunction, patients with congenital heart disease may have additional susceptibility to developing CSA from residual shunts, cyanosis, and altered pulmonary vascular hemodynamics. This patient was asymptomatic from his congenital heart condition and his Ebstein anomaly was diagnosed incidentally during cardiac work up of his central sleep apnea.

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1332

BRAINSTEM GLIOMA UNVEILED BY SLEEP APNEA IN A PEDIATRIC PATIENT: A CASE REPORT

Neetu Scariya, Glen Greenough

Dartmouth Hitchcock Medical Center

Introduction: Sleep disorders can be associated with a variety of neurological disorders including with CNS neoplasms. There have been various cases of CNS neoplasms presenting with sleep disorders including obstructive and central sleep apnea, hypersomnia, narcolepsy, night terrors, epileptic somnambulism, insomnia, and sleep walking. This case report illustrates a case of what sounded like straightforward obstructive sleep apnea at consultation but what turned out to be sleep apnea with a high frequency of central apneas seemingly secondary to a probable brainstem glioma.

Report of case(s): A 13 yo male presented with symptoms of snoring, witnessed apneas, nocturnal gasping, daytime tiredness, and nocturia. Past medical history included prediabetes and laryngomalacia (treated with supraglottoplasty in infancy and with subsequent otolaryngology evaluation years later showing no evidence of significant laryngomalacia). Exam was notable for BMI percentile >99% for age, Mallampati 3, 2+ tonsils. Polysomnography (PSG) was ordered for suspected obstructive sleep apnea. The PSG revealed severe sleep apnea (AHI 94.8, OAH 58.7). All hypopneas were categorized as obstructive by default as central hypopneas were not scored. The apnea events were subtyped with a substantial number of central events present (CAI 36.1, MAI 9.3, OAI 0). Significant desaturations accompanied these respiratory events, with a nadir oxygen saturation of 70%, a mean saturation of 91%, and a cumulative 75 minutes at or below 88%. Given the high frequency of central apneas, an evaluation for causes of central sleep was conducted. An MRI brain revealed an ill-defined FLAIR hyperintense non-enhancing mass adjacent to the posterior medulla oblongata consistent with a glioma.

Conclusion: The presence of a high frequency of central apneas in a pediatric patient should raise concern for an underlying neurologic disorder. When central apneas are noted in pediatric patients, a thorough evaluation for potential underlying etiologies – including Chiari malformation or intracranial tumors – is essential.

Support (if any):

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1333

WHAT WAS LOST CAN BE FOUND: RECOVERY OF RESPIRATORY CONTROL AFTER STROKE IN A PEDIATRIC PATIENT

Joanna Lee, Kevin Kaplan

Baylor College of Medicine

Introduction: Hemorrhagic stroke can lead to sleep-disordered breathing (SDB), typically central sleep apnea (CSA), by damaging the brain's respiratory control centers. We present a pediatric case of obstructive (OSA) and CSA secondary to hemorrhagic stroke in the setting of atrioventricular malformation (AVM) rupture, and the evolution of imaging findings that accompanied loss and subsequent recovery of breathing control.

Report of case(s): A 13-year-old previously healthy female presented with new-onset headache and altered mental status secondary to an acute hemorrhagic stroke. A ruptured posterior fossa/cerebellar AVM was discovered as the etiology. She suffered acute respiratory failure requiring tracheostomy placement and mechanical ventilation. With clinical improvement, capping trials were attempted but failed due to apneas secondary to the underlying traumatic brain injury. 6 months after the initial injury, she was discharged on BPAP ST with settings of 10/5 cmH₂O with a rate of 14 breaths per minute (bpm). One month after discharge, she had an accidental decannulation and her tracheostomy was unable to be re-established. A polysomnogram (PSG) at this time showed moderate obstructive (oAHI 7.3 events/hr) and central sleep apnea (CSAI 6.2 events/hr). She was discharged on non-invasive ventilation on BPAP ST 9/4 cmH₂O with a backup rate of 12 bpm. After a year of therapy, she had shown clinical improvement, regaining the ability to speak in full sentences and near-complete functionality of her left hemibody. A repeat baseline PSG showed improvement to mild OSA (oAHI 1.7 events/hr) with no significant CSA (CSAI 2.8 events/hr), after which BPAP ST was discontinued. A follow-up MRI brain showed no evidence of AVM residual with encephalomalacia in the left cerebellum, medial right cerebellum, and brainstem.

Conclusion: Although hemorrhagic stroke can lead to SDB, it is important to monitor and re-evaluate sleep apnea, which may improve as a result of neuroplasticity.

Support (if any):

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1334

PERIPHERAL ARTERIAL TONOMETRY SLEEP TESTING IN A PATIENT WITH LEFT VENTRICULAR AND RIGHT VENTRICULAR ASSIST DEVICES

Adrienne DaGue, Huzaifa Wasanwala, Amira Dalmazio, Ruckshanda Majid, Reeba Mathew, Calli Bertschy, Bindu Akkanti, Kha Dinh, Lilit Sargsyan

McGovern Medical School at University of Texas Health Science Center at Houston

Introduction: Patients with reduced left ventricular ejection fraction (HFrEF) are at elevated risk for central and obstructive sleep

apnea (OSA). We describe a case illustrating the use of peripheral arterial tonometry (PAT)-based sleep testing in a hospitalized patient with end-stage heart failure supported by both left and right ventricular assist devices (LVAD and RVAD), raising important considerations regarding the diagnostic performance and limitations of PAT technology in individuals with continuous-flow mechanical circulatory support.

Report of case(s): A 40-year-old male (BMI 35.9 kg/m²) with non-ischemic cardiomyopathy, HFrEF (EF 25-30%), atrial fibrillation, obesity, and previously diagnosed severe OSA but not on positive airway pressure (PAP) therapy was admitted with decompensated end-stage heart failure. He underwent LVAD implantation, which was complicated by right ventricular failure necessitating RVAD placement. During his hospital course, apneas during sleep were witnessed, prompting further evaluation for sleep-disordered breathing. Given the inability to undergo in-laboratory polysomnography, portable sleep assessments using PAT-based devices were implemented. Sleep testing was first attempted with the WatchPAT 300® while supported by both an LVAD and RVAD and on empiric bi-level PAP (BPAP 12/8 cm H₂O). The initial test was nondiagnostic due to improper positioning of the finger probe. A second night study was performed, which was also inconclusive, demonstrating an attenuated PAT signal. After several weeks, the patient's RVAD was successfully removed, leaving him supported solely by an LVAD. Two SomFit® sleep studies using a forehead-mounted sensor were performed, first while on supplemental oxygen at 2 L/minute and the second while on room air. These studies also remained non-diagnostic due to minimal PAT signal amplitude, presumed again to be secondary to the patient's low pulsatility index and altered hemodynamic profile under continuous-flow LVAD support.

Conclusion: Peripheral arterial tonometry reliability is limited in LVAD/RVAD patients because continuous-flow support reduces pulsatility and blunts autonomic responses, impairing sleep staging and detection of respiratory-related vascular changes. Altered preload, impaired baroreflex function, and poor peripheral perfusion can distort PAT signals, leading to under-recognition or misclassification of sleep-disordered breathing events. As a result, PAT-derived apnea metrics should be interpreted cautiously, and formal polysomnography remains the preferred diagnostic modality in this population.

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1335

SEXSOMNIA IN A 24-YEAR-OLD MALE

Bomaonye Tienabeso

University of Oklahoma

Introduction: Sexsomnia is a rare non-rapid eye movement type of parasomnia. Parasomnia refers to unusual sensations and behaviors, such as sleepwalking, that patients may experience or exhibit while asleep, falling asleep, and/or waking up. In the case of sexsomnia, people engage in sexual behaviors such as masturbation, sexual movements, sexual aggression, or initiating sex with another person. Though their eyes may be open and they may make sexual noises, they are asleep during these episodes and unaware of their behavior once they are awake. Through a study performed in 2010, only 7.6% of the 832 patients with sleep-related disorders had symptoms related to sexsomnia. It is found to be even more rare in the general population. Management

of these rare cases are important for both patients and patient bedside partners in order to minimize potential harms.

Report of case(s): 24-year-old male presented to a Sleep Clinic due to problems observed by his wife while he was sleeping. The couple had recently married 1.5 years ago, at which time the patient's wife had noticed him trying to initiate sexual intercourse a few times a week after falling asleep. The patient's wife would wake him up, stopping the episode, but he never recalled his behavior. The wife stated the behavior was non-aggressive and would not be repeated once he was woken up. Once awoken he expressed confusion as to why his clothes were removed. He did not take prescription medications or over-the-counter medications. He drank alcohol on rare occasions and denied recreational drug use. He also denied recent stressors or trauma. However, the patient reported sexual abuse during childhood by a male family member that occurred for several years. He was currently undergoing counseling related to the sexual abuse.

Conclusion: After an in-lab sleep study showed no other sleep disorders, such as sleep apnea, he was started on Clonazepam 0.5mg before bed for the diagnosis of sexsomnia. Two months later, follow-up revealed significant improvement. The patient and his wife continued to sleep in the same bedroom. Per the patient's wife, she had not been awoken from initiated sexual acts and he had been sleeping through-out the night.

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1336

SUCCESSFUL TREATMENT OF ISOLATED REM BEHAVIOR DISORDER WITH PRAZOSIN

Paul Cusmano, Jennifer Creamer, J. Kent Werner, Sharmeela Kuperan
Walter Reed National Military Medical Center

Introduction: Rapid Eye Movement (REM) Behavior Disorder (RBD) is defined by the loss of skeletal muscle atonia during REM sleep, associated with sleep vocalization and/or complex motor behaviors. While RBD may be secondary to medications and untreated sleep disorders, isolated RBD (iRBD) is likely secondary to alpha synucleinopathy. Treatment for iRBD commonly includes nightly melatonin and benzodiazepines, however one case report and neurophysiology data from animal studies suggest norepinephrine antagonism may be effective.

Report of case(s): An 82-year-old male presented with a four-year history of biweekly episodes of arm swinging, leg kicking, and yelling during sleep. No significant medical/psychiatric/medication history. Frequent nightmares of violent and persecutory content prompted initiation of prazosin 1 mg by primary care with reduction in frequency of nighttime motor/vocal activity. Polysomnography demonstrated an apnea hypopnea index of 14.1 and absence of REM sleep without atonia (RSWA). He started PAP therapy and was trialed off prazosin, resulting in an immediate rebound of nighttime motor and vocal activity. Prazosin was resumed and titrated to 2 mg, with reduced frequency of nightmares and associated activity to once every three months. Subsequent CPAP titration study demonstrated RSWA. History and physical revealed: worsening paranoid ideation, decreased blink rate, L > R resting tremor of the hands, bilateral wrist and elbow rigidity, L > R upper/lower extremity dysmetria and dysidiadokinesia, and reduced left arm swing. Neurology was consulted for suspicion of alpha synucleinopathy.

Conclusion: Prazosin may be a reasonable consideration for treatment of nightmares and dream enactment behavior in patients with iRBD. Noradrenergic stimulation of the sublaterodorsal nucleus (SLD) via the locus coeruleus inhibits motor neuron atonia. Alpha blockers may restore atonia during REM sleep in patients with RBD by its antagonistic effect on central alpha-1 receptors thereby hindering the typical inhibitory effect of norepinephrine on the SLD. This is partly supported by one other published case report of successful treatment of RBD with prazosin, which was confounded by concurrent use of melatonin.

Support (if any): The views expressed herein are those of the authors and do not reflect the official policy of the Department of War or U.S. Government.

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1337

POLYTRAUMA MEDICINE CONSULT DUE TO NOCTURNAL FALL: A CASE OF REM SLEEP BEHAVIOR DISORDER

Jasleen Ghag, Chad Rieck

Washington State University

Introduction: Falls are the leading cause of fatal and nonfatal injuries among adults ages 65 years and older, with 1 in 4 older adults reporting a fall every year. REM Sleep Behavior Disorder (RBD), characterized by dream enactment during REM sleep, can precede neurodegenerative diseases such as Parkinson's disease (PD). This case highlights the importance of thorough fall assessments in uncovering early signs of neurodegenerative pathology.

Report of case(s): A 73-year-old male with a history of hypertension presented to Providence Everett Medical Center as a poly-trauma patient following a nocturnal fall. He sustained four rib fractures and required one day of intensive care monitoring. In accordance with institutional policy, a medicine consultation was initiated to evaluate for underlying medical contributors to the fall. The initial fall was recorded as mechanical fall. Detailed history revealed a two-year pattern of dream enactment behaviors, including shouting and flailing during sleep, previously unreported to medical providers. His presenting fall was due to a vivid dream of a gorilla chasing him, during which he ran into his dresser while still sleeping, striking it and falling to the ground. No new medications or supplements were reported; he only takes amlodipine for HTN. Laboratory studies were normal. Imaging revealed left 4-7 rib fractures. He was found to have cogwheel rigidity and bradykinesia in left upper extremity. Family history notable for sister with PD diagnosed at age 75. The patient was started on melatonin, resulting in partial improvement of RBD symptoms. He was advised to follow up with his primary care provider for further titration and neurology. At his neurology appointment, he was formally diagnosed with Parkinson's disease.

Conclusion: This case underscores the diagnostic value of a comprehensive fall history in older adults, detailed neurologic examination, and ruling out alternative causes of falls. RBD may be an early manifestation of synucleinopathies such as PD, often preceding motor symptoms by years. Early recognition can prompt timely neurological referral, safety interventions, and symptom management.

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1338

SSRI-INDUCED REM SLEEP BEHAVIOR DISORDER WITH SYMPTOM RESOLUTION AFTER ANTIDEPRESSANT DISCONTINUATION

Sheeva Norooz, Joseph Ramzy, Kaitlyn Musco

St. Lukes University Health Network

Introduction: Rapid eye movement (REM) sleep behavior disorder (RBD) associated with selective serotonin reuptake inhibitors (SSRIs) is considered extremely rare, even though serotonergic antidepressants are widely prescribed. Many patients taking SSRIs may show subtle REM sleep without atonia (RSWA) on polysomnography, but very few develop true RBD with dream-enactment behaviors. We describe a case of SSRI-associated RBD confirmed on polysomnography, with complete resolution of symptoms following withdrawal of the medication.

Report of case(s): A 45-year-old man with PTSD, nightmare disorder, bipolar disorder, and anxiety presented with a 15-year history of dream enactment behaviors including shouting, punching, and falling out of bed, resulting in recurrent injuries. Symptoms suspected to have begun after initiation of fluoxetine, which he had remained on for over a decade. Initial PSG in 2024 showed markedly reduced sleep efficiency without REM sleep. Repeat PSG in January 2025 demonstrated RSWA with a documented episode of dream enactment during REM sleep (sitting up and picking at the bed sheets). AHI was 1.8, excluding obstructive sleep apnea as a contributing factor. While awaiting psychiatric coordination to wean off Fluoxetine, he was treated with melatonin titrated to 6 mg nightly, which reduced the frequency and severity of behaviors but did not eliminate them. After psychiatric clearance, Fluoxetine was tapered and discontinued. Within several weeks, the patient experienced complete resolution of dream enactment behaviors and nightmares. A brief recurrence occurred after initiation of Vilazodone, which again resolved after discontinuation. He remained asymptomatic on melatonin alone, which was subsequently tapered.

Conclusion: SSRI-induced RBD is rare but clinically significant. This case demonstrates the importance of recognizing medication-associated parasomnias, confirming RSWA on PSG, coordinating antidepressant modification, and using interim symptom-targeted therapy to prevent injury. Resolution after SSRI withdrawal supports a causal relationship.

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1339

RECURRENT INJURIOUS NOCTURNAL HYPERMOTOR EPISODES: DIAGNOSTIC ASSESSMENT OF PARASOMNIA OVERLAP SYNDROME AND SLEEP-RELATED HYPERMOTOR EPILEPSY

Mary Rehman¹, Jennifer Creamer¹, Jack Galagan², Kent Werner¹, Sharmeela Kuperan¹

¹Walter Reed National Military Medical Center, ²Alexander T. Augusta Military Medical Center

Introduction: Sleep-Related Hypermotor Epilepsy (SHE) and parasomnias often present with overlapping hypermotor behaviors,

complicating diagnosis. We report a case of a stereotyped, injurious nocturnal motor disorder in which sequential polysomnography (PSG) and extended video-EEG monitoring ultimately supported a diagnosis of parasomnia overlap syndrome.

Report of case(s): A 49-year-old male with well-controlled obstructive sleep apnea presented with recurrent injurious nocturnal hypermotor episodes, culminating in right tibia-fibula fracture requiring surgical fixation. He described several years of 5–7 nightly, 30-second episodes of abrupt arousal, leaving the bed, and uncontrolled limb movements, with partial awareness. History included childhood somnambulism which resolved at age twelve and remote dream enactment behavior. Neurologic exam, MRI, and baseline EEG were unremarkable. PAP-titration polysomnography captured eight stereotyped hypermotor episodes during N3 sleep, featuring dystonic posturing, hyperkinetic limb movements, and semi-purposeful CPAP manipulation, lasting 45–90 seconds. Some episodes were preceded by rhythmic theta activity; periodic limb movement index was 40/hr. Clonazepam (1 mg nightly) prevented further falls but did not significantly reduce event frequency. Epilepsy Monitoring Unit (EMU) admission (off clonazepam) recorded 3 push button events arising from N3 sleep with paroxysmal arousals, rapid autonomic activation, and limb shaking, but no ictal EEG activity. EMU assessment was low likelihood of SHE. Subsequent PSG with CPAP demonstrated REM sleep without atonia. A FLEP (frontal lobe epilepsy and parasomnia) score of +2 was suggestive of epileptic hypermotor events, possibly corroborated by rhythmic theta, though this can be a normal variant. Transition from desvenlafaxine to bupropion and resumption of clonazepam correlated with near resolution of events.

Conclusion: This case illustrates diagnostic complexity of nocturnal hypermotor events, where clinical features and nondiagnostic EEG blur distinctions among NREM parasomnia and SHE. Parasomnia overlap syndrome was favored given evidence of both REM and NREM parasomnias with negative seizure evaluation. Negative scalp EEG is supportive rather than diagnostic, since only 10–50% of awake and 50% of asleep patients with SHE show interictal abnormalities. The case underscores the limitations of scalp EEG and scoring tools, and highlights the importance of longitudinal assessment, PAP and medication optimization, and safety.

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1340

FRONTAL LOBE EPILEPSY PRESENTING AS PARASOMNIA IN A CHILD ON BIPAP FOR SEVERE OBSTRUCTIVE SLEEP APNEA

Swati Jayaram¹, Abdul Khuhro², Katelyn Krivchenia², Maninder Kalra²

¹The Ohio State University, ²Nationwide Children's Hospital

Introduction: Parasomnias are common in pediatric patients with obstructive sleep apnea (OSA), but true nocturnal seizures can closely mimic parasomnia-like behaviors. Distinguishing between the two is critical, particularly in children using positive airway pressure (PAP), where sleep fragmentation, mask intolerance, or residual OSA may confound the clinical picture. We present a case of a child on BiPAP for severe OSA who was evaluated for worsening sleepwalking and was ultimately diagnosed with frontal lobe epilepsy during PAP titration polysomnography (PSG).

Report of case(s): A 9-year-old male with asthma and history of adenotonsillectomy initially presented in 2023 with a baseline PSG demonstrating severe OSA with an apnea-hypopnea index (AHI) of 34.5 events/hour (obstructive AHI 33.8, REM AHI of 82.5, and an oxygen saturation nadir of 61% during REM) without evidence of hypoventilation. He subsequently underwent PAP titration, resulting in a recommendation for BiPAP at 13/7 cm of water due to persistent hypoxemia on CPAP. Over the next two years, he demonstrated good clinical response to therapy; however, at follow-up, family reported increasing episodes of sleepwalking and mask discomfort, as well as nocturnal episodes during which he would suddenly wake up yelling and rip off his mask, leading to poor PAP adherence. A repeat PAP titration with extended EEG was performed. During the study, interictal EEG abnormalities with frontal dominance were noted, including arrhythmic delta activity over the frontal regions. Five discrete nocturnal events characterized by dystonic upper extremity posturing and brief hypermotor activity were recorded. These episodes were consistent with frontal lobe epilepsy rather than parasomnia. From a respiratory standpoint, he continued to demonstrate persistent severe OSA requiring continued PAP therapy. Given the abnormal EEG findings, the patient was referred to pediatric neurology and was started on anti-seizure medications.

Conclusion: This case highlights the importance of maintaining a broad differential diagnosis when evaluating parasomnia-like behaviors in children with OSA, especially those on PAP therapy. Repeat PSG with extended EEG monitoring played a pivotal role in differentiating epileptic events from parasomnia and allowed timely initiation of antiepileptic therapy.

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1341

RE-EMERGENCE OF NIGHT TERRORS TRIGGERED BY SEMAGLUTIDE THERAPY: A DOSE-DEPENDENT NREM PARASOMNIA PHENOMENON

Maithili Udupa

University Hospitals Cleveland Medical Center

Introduction: NREM parasomnias such as night terrors typically present in childhood and rarely recur in adulthood without identifiable triggers. Contributing factors include sleep deprivation, psychiatric stress, medications, or underlying sleep disorders. Glucagon-like peptide-1 (GLP-1) receptor agonists, including semaglutide, are increasingly used for metabolic disease and have recognized central nervous system effects with emerging reports of vivid dreaming and sleep disruption. However, their association with NREM parasomnias has not been described. We report a case of dose-dependent recurrence of night terrors following semaglutide initiation in an adult with remote childhood parasomnia.

Report of case(s): A 42-year-old woman with class 2 obesity (BMI 36.8 kg/m²), migraine without aura, and mild generalized anxiety disorder presented with new nocturnal episodes occurring 60–90 minutes after sleep onset. Events involved sudden screaming, thrashing movements, marked confusion, and autonomic activation lasting several minutes followed by complete amnesia—consistent with night terrors. No dream enactment behaviors/features of REM sleep behavior disorder were present. Her sleep schedule was stable (10 PM–6 AM) without shift work, substance use, or recent stressors. Two weeks before symptom onset, she

began semaglutide 0.25 mg weekly, later titrated to 0.5 mg. Parasomnia frequency increased in parallel with dose escalation. Neurologic examination was normal. Laboratory evaluation (CBC, CMP, TSH, ferritin, vitamin B12, hemoglobin A1c) was unremarkable. Prior home sleep apnea testing showed no sleep-disordered breathing and she was not using SSRIs, TCAs, benzodiazepines, or hypnotics. Because of the temporal association, semaglutide was reduced to 0.25 mg weekly. Night terrors decreased immediately and resolved within 10 days. At three-month follow-up she remained asymptomatic at the lower dose. When she inadvertently resumed 0.5 mg weekly, symptoms recurred within 48 hours and again resolved after dose reduction, demonstrating a dose-dependent effect.

Conclusion: This case demonstrates a likely association between semaglutide and recurrence of NREM parasomnias in an adult supported by clear temporal and dose-dependent patterns. GLP-1-related effects on arousal regulation or N3 sleep stability may lower the threshold for parasomnia expression in predisposed individuals. As use of GLP-1 agonists expands, clinicians should monitor for new sleep-related behaviors and consider dose reduction when parasomnias occur as symptoms may resolve without discontinuing therapy.

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1342

A MULTIDISCIPLINARY SLEEP-PSYCHIATRY APPROACH TO EXPLODING HEAD SYNDROME IN A VETERAN WITH PTSD

Nicholas Shaffer¹, Tara Thomas², Ashley Wilk², Supriya Singh²

¹Baylor College of Medicine, ²Michael E. DeBakey VA Medical Center

Introduction: Exploding Head Syndrome (EHS) is a benign parasomnia characterized by sudden sensory “explosions” at sleep-wake transitions, which can aggravate insomnia and PAP intolerance in PTSD.

Report of case(s): We report a 79-year-old veteran with chronic obstructive and central sleep apnea, long-standing PTSD, and depression, who experienced nightly episodes of explosive sounds accompanied by flashes of light, myoclonic jerks, tachycardia, and panic, leading to removal of positive airway pressure (PAP) equipment. Earlier records (2007–2008) described poor sleep hygiene, insomnia linked to PTSD/depression, parasomnia-like symptoms, and evolving PAP intolerance. After being lost to follow-up, he represented in 2023 with severe sleep fragmentation and recurrent “gunshot-like” awakenings consistent with EHS. Polysomnography (1/12/2024) captured an event at the transition from wakefulness to N2 sleep and revealed an AHI of 66.2/hour (central 45.4/hour; SpO₂ nadir 85%). PAP titration to 13 cm H₂O normalized breathing (residual AHI 0/hour). Two-week actigraphy (10/21–11/03/2024) showed ~5 hours of sleep, 74% efficiency, ~20 awakenings/night, and an irregular sleep schedule. A multidisciplinary plan included structured psychiatric interviews, sleep diaries, and measurement-based care. Sleep psychiatry optimized sertraline (200 mg/day) and added buspirone (7.5 mg TID) and gabapentin (900 mg BID) to reduce anxiety and hyperarousal. Behavioral sleep medicine delivered CBT-I tailored to PTSD triggers with PAP desensitization, emphasizing stimulus control, relaxation,

and gradual sleep-window extension. Mindfulness and alpha-frequency cranial stimulation were adjuncts. Over eight months, EHS frequency decreased from nightly (~7/week) to 1–2/week with reduced intensity. Sleep efficiency improved to ~94% with 2–3 awakenings/night, and Insomnia Severity Index dropped from 26 to 7. Nightmares declined, and PAP adherence temporarily improved before later relapse due to PTSD-related distress, prompting hypoglossal nerve stimulation implant evaluation. At one-year follow-up, EHS symptoms remained improved without adverse effects.

Conclusion: In this veteran with PTSD and severe sleep-disordered breathing, EHS improved with integrated pharmacologic anxiety modulation and CBT-I with PAP desensitization. Collaborative sleep-psychiatric and behavioral care reduced arousal sensitivity and produced durable improvements in symptoms and sleep quality, even as alternative therapies were pursued for persistent sleep apnea.

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1343

NOT JUST IN YOUR HEAD: RECOGNIZING EXPLODING HEAD SYNDROME AS A SLEEP DISORDER

Hollyann Loui¹, Melisa Chang²

¹UCLA, ²West Los Angeles Veterans Affairs Medical Center

Introduction: Exploding head syndrome (EHS) is characterized by the perception of a sudden loud noise or explosion in the head that occurs as the patient is falling asleep or waking up, typically associated with fear. The sensation is painless, lasts a few seconds, and may be associated with a flash of light or myoclonic jerk.

Report of case(s): A 63-year-old man with diabetes and hypertension reported hearing loud clapping noises while falling asleep for the last 25 years, occurring 5–6 times weekly. He described the sounds as someone “clapping against the wall”. The sounds occurred only during the transition from wake to sleep. The noises distressed him and made it challenging for him to fall back asleep. He denied any associated pain, visions, or jerking movements. He previously worked at a refinery and worked a rotating shift, but had recently retired. His Epworth Sleepiness Scale was 2. His Insomnia Severity Index was 5. He underwent a polysomnogram with extended electromyography that showed moderate obstructive sleep apnea (OSA) with an apnea-hypopnea index of 22/hr. His brain MRI was normal. Audiologic examination found mild sensorineural hearing loss. He had no history of seizures, headache disorders, or psychiatric conditions. He was diagnosed with EHS. During a follow-up visit 6 months later, he reported that the episodes had reduced to 1–2 times weekly. He had not yet started treatment for his OSA at that time.

Conclusion: The pathophysiology of EHS remains unknown. EHS is an underrecognized parasomnia, with lifetime prevalence ranging from 10% to over 30%. While frightening, EHS is generally considered to be a benign and self-limited condition. There is currently no established association between EHS and OSA, nor is there a known association between hearing loss and EHS. EHS is most strongly associated with insomnia, sleep paralysis, and dissociative experiences. Treatment includes reassurance about the benign nature of the condition, and addressing sleep quality

and insomnia symptoms, as poor sleep and psychological distress are associated with increased EHS frequency. We suspect that retirement from shift work (which improved his sleep) and education about the condition likely contributed to the reduction in his EHS frequency.

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1344

NIGHTTIME DECEPTIONS, MELATONIN CORRECTIONS: A NOVEL CASE OF MELATONIN-RESPONSIVE COMPLEX NOCTURNAL HALLUCINATIONS IN A CHILD

Joshua Lee¹, Jordan Ruff², Roberta Leu², Amit Shah²

¹Emory University, ²Children's Healthcare of Atlanta

Introduction: Complex nocturnal visual hallucinations arise during sleep onset or nighttime awakenings and can be a significant source of anxiety for children and their caregivers. Although isolated reports have described successful treatment with melatonin in adults, its efficacy in pediatric patients has not been reported. Herein, we present the first known pediatric case of complex nocturnal visual hallucinations demonstrating a dramatic response to melatonin.

Report of case(s): A 6-year-old female with no significant neurological comorbidities presented with frequent, intricate visual hallucinations associated with poor sleep quality and daytime fatigue. The hallucinations, occurring nightly for three weeks, involved seeing worms crawling over her body and bedroom during nocturnal awakenings to use the restroom. She was fully awake during the events, which lasted 1–2 hours, and had full recollection of events in the morning. Past history included transient nocturnal hallucinations several years prior during her father's military deployment that self-resolved and a history of snoring but no sleep-disordered breathing on polysomnogram. She also endorsed symptoms of restless leg syndrome separate from her visual hallucinations and was started on oral iron therapy for sub-optimal ferritin levels. Standard sleep hygiene and behavioral interventions were ineffective. Evaluation with pediatric psychology identified symptoms of anxiety but did not identify any additional psychiatric disorders, psychological stressors, or underlying trauma. Family denied any prescribed or over-the-counter medications. There was no improvement in her nocturnal hallucinations with the introduction of iron. Following initiation of melatonin (3 mg, immediate-release, 30 minutes before bedtime), the frequency and intensity of hallucinations decreased markedly within several days, with complete resolution within one week. While she continues to wake up nightly to use the restroom, reported sleep onset latency and total sleep time also improved. No adverse effects were observed at 4-month follow-up with continued resolution with melatonin.

Conclusion: This is the first known reported case of pediatric melatonin-responsive complex nocturnal hallucinations to our knowledge and aligns with adult reports of melatonin-responsive nocturnal hallucinations. It highlights the potential therapeutic role of melatonin in this population. Further research is needed to clarify optimal dosing, indications, and underlying mechanisms for melatonin-responsive complex nocturnal hallucinations.

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1345

HOME CAMERA TECHNOLOGY AS COLLATERAL IN THE EVALUATION AND MANAGEMENT OF TREATMENT-REFRACTORY REM SLEEP BEHAVIOR DISORDER

Christopher Lau¹, Tara Rachakonda², Alon Avidan¹

¹University of California Los Angeles, ²The Sleep Center of Nevada

Introduction: REM Sleep Behavior Disorder (RBD) is characterized by loss of REM atonia and dream enactment behaviors, which can result in significant injury risk. While polysomnography (PSG) is the gold standard for diagnosis, in-lab studies may not always capture the full extent of nocturnal behaviors. Home camera technology offers a novel, accessible means to document and assess sleep-related behaviors in the patient's natural environment, potentially enhancing diagnostic accuracy and management.

Report of case(s): A 51-year-old female presented with a three-year history of severe insomnia and violent parasomnias, including yelling, kicking, and falling out of bed. Her sleep was highly fragmented, with sleep onset often delayed until 3:30 AM and frequent abrupt awakenings associated with dream enactment. PSG confirmed REM without atonia and dream enactment behaviors, but the most compelling evidence of the frequency and severity of her behaviors was provided by home video recordings (Ring camera), which captured multiple episodes of dream enactment and injury risk. The patient's management was further complicated by chronic insomnia and iron deficiency (ferritin 11 ng/mL despite oral supplementation). Multiple pharmacologic and behavioral interventions—including clonazepam, melatonin, hypnotics, orexin antagonists, and cognitive behavioral therapy for insomnia—were unsuccessful. The care plan included transition to intravenous iron, continued safety interventions, and ongoing medication optimization. Home video documentation was instrumental in risk assessment, guiding treatment adjustments, and engaging the patient and her caregivers in safety planning.

Conclusion: This case highlights the value of home camera technology as collateral information in both the diagnosis and ongoing management of RBD. Video documentation provided objective evidence of dream enactment behaviors, informed risk assessment, and supported individualized safety interventions. Integration of home camera technology into clinical practice may improve diagnostic confidence, facilitate tailored interventions, and promote safety in patients with severe parasomnias.

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1346

DREAM ENACTMENT BEHAVIORS TRIGGERED BY RUPTURED PONTINE CAVERNOMA S/P REPAIR

Alexa Becerra-Almendarez

UC Davis

Introduction: REM sleep behavioral disorder (RBD) is largely associated and studied through the lens of alpha synucleinopathies. The literature on structural causes of RBD is sparse. Here, we present a novel case of new onset RBD after surgical resection of rupture pontine tegmental cavernoma. This case highlights the

anatomical importance of pons in regulating REM sleep and REM sleep related atonia.

Report of case(s): The patient is a 70-year-old man with a history of tonsillar cancer s/p right radical dissection radiation chemotherapy. He presented to ER with acute onset left arm weakness and diplopia in 2023. Neuroimaging demonstrated symptomatic right ICA stenosis and an incidental pontine cavernoma (7x7x9 mm). He underwent trans carotid artery revascularization, with symptomatic improvements. One year later, he experienced worsening diplopia with gait imbalance. Repeat neuroimaging showed bleeding due to ruptured pontine cavernoma in the pons and he subsequently underwent surgical resection. He developed involuntary leg jerking/kicking during sleep 3 months after the procedure. The abnormal movements were thought to be due to periodic limb movements, therefore ropinirole was attempted to assess response. Ropinirole was discontinued after one month due to worsening leg movements and sexual compulsions. As time progressed, he began displaying dream enactment behaviors such as punching, whole body thrashing, and vocalizations. Repeat MRI brain revealed residual post-operative scar tissue in the pons. Overall, his clinical picture remains highly suggestive of a pontine lesion induced RBD. To our knowledge, there is only one other case of non-ruptured pontine cavernoma related RBD in the literature. PSG for RBD confirmation and RSWA quantification is currently pending. The patient and spouse were instructed to complete a nightly journal of dream enactment behaviors. He had suboptimal response to melatonin. Given history of balance and baseline cognitive complaints after surgery, we decided against clonazepam. The patient expressed interest in trying sodium oxybate. We will assess the response to the treatment with RBD Episode Diary.

Conclusion: This case illustrates the critical role of the brainstem/pons in REM sleep regulation and REM sleep related atonia. The sub optimal response to melatonin and experimental treatment modalities also needs to be highlighted in this scenario.

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1347

NOCTURNAL BEHAVIORS IN PRIMARY ANGIITIS OF THE CENTRAL NERVOUS SYSTEM (PACNS): SLEEPWALKING OR SEIZURES?

Jennifer Tran, Melisa Chang
University of California Los Angeles

Introduction: Nocturnal events characterized by complex motor behaviors, vocalizations, and altered awareness are commonly attributed to NREM parasomnias which include behaviors such as sleepwalking and night terrors. However, these presentations can closely mimic epilepsy, particularly frontal lobe epilepsy (FLE), due to overlap in semiology. This clinical overlap can cause diagnostic confusion and frequently leads to misdiagnosis.

Report of case(s): Herein, we present this case of a 62-year-old male patient with a history of presumed Primary Angiitis of the Central Nervous System (PACNS) who presented to our sleep clinic with abnormal nocturnal behavior. The patient's initial presentation in 2015 included dysphagia and dysarthria. Brain MRI at that time revealed intermittent left frontal lobe T2/FLAIR hyperintensities, and cerebral angiography demonstrated beading and distal areas of stenosis corresponding to the region of hyperintensity. Based on these findings, a diagnosis of presumed

PACNS was made, and the patient has remained on chronic immunosuppression since 2015. The patient reported a long-standing history of sleepwalking, previously occurring every 6 months however now increasing in frequency to every 6-8 weeks. He described episodes in which he awoke in a different part of his home, such as the living room, and discovered that he had moved household items during the night, with no recollection of these events. He was referred to Neurology to evaluate for underlying seizure activity.

Conclusion: Our case highlights the diagnostic challenges in distinguishing NREM parasomnias from nocturnal seizures, particularly in patients with underlying neurological disorders such as PACNS. Misdiagnosis of seizure activity as benign NREM parasomnias can delay appropriate diagnosis and management of seizures; and vice versa, misdiagnosing parasomnias as epilepsy can lead to unnecessary antiseizure therapy and side effects. Physicians should maintain a high index of suspicion for seizure activity in patients with abnormal nocturnal events who have underlying neurological disease as early recognition and accurate diagnosis are crucial to effective treatment and improve quality of life.

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1348

REM SLEEP EEG PATTERN MIMICKING SEIZURES: A CASE OF SUBCLINICAL RHYTHMIC ELECTROGRAPHIC DISCHARGES OF ADULTS

Ivan Escalona Puig¹, Emma Lipshultz¹, Snigdha Ila², Alexandre Abreu¹, Eric Geil³, Kori Ascher¹, Douglas Wallace¹, Hao Cheng⁴

¹University of Miami, ²University of Miami/Miami VA Medical Center, ³Veteran Affairs Medical Center, ⁴Miami VA Medical Center

Introduction: Rhythmic electrographic patterns encountered during polysomnography (PSG) may closely resemble ictal activity, particularly when they occur in unexpected sleep stages. Subclinical Rhythmic Electrographic Discharges of Adults (SREDA) is a benign EEG variant that may be mistaken for seizures but is rarely described during rapid eye movement (REM) sleep. We report an unusual case of REM-restricted rhythmic activity initially concerning for seizures that was ultimately recognized as SREDA.

Report of case(s): A 67 year old man with obstructive sleep apnea (OSA) presented with persistent non-restorative sleep and excessive daytime sleepiness despite of optimal adherence to auto-adjusting positive airway pressure (APAP) therapy. He had undergone prior neurologic evaluation for suspected seizures and was empirically treated with lacosamide, which was later discontinued after identification of SREDA on EEG. He subsequently returned for reassessment of OSA, and an in-laboratory PAP titration demonstrated effective control of respiratory events at APAP setting of 5 to 11 cmH₂O. During REM sleep, recurrent episodes of rhythmic, sharply contoured theta activity lasting 10–20 seconds were observed. These discharges displayed uniform morphology, lacked temporal or spatial evolution and were unaccompanied by clinical, behavioral or autonomic changes. Although initially raising concern for ictal activity, detailed electrographic analysis favored a benign pattern.

Conclusion: Rhythmic discharges confined to REM sleep are uncommon and may be misinterpreted as seizures, particularly given that epileptic events rarely arise during this sleep stage. In

this case, careful morphologic assessment supported a diagnosis of SREDA rather than ictal activity, thereby preventing unnecessary antiseizure therapy and additional neurologic evaluation. Awareness that benign EEG variants such as SREDA may rarely present during REM sleep is essential for accurate interpretation of sleep EEG recordings

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1349

REM PREDOMINANCE ON POLYSOMNOGRAPHY (58.7%)

Sheila Rajan¹, Aarti Grover¹, Greg Schumaker¹, Eric Bifolck², Joel Oster¹, Wei He¹, Rajesh Zacharias¹

¹Tufts University, Tufts Medical Center, ²Lowell General Hospital

Introduction: Rapid eye movement (REM) sleep constitutes 20 to 25 percent of total sleep time (TST) in healthy adults. An increase in REM sleep, termed REM rebound or predominance, is typically observed after sleep deprivation, withdrawal of REM-suppressing agents, initiation of positive airway pressure therapy, or in major depressive disorder (MDD). We present a case with a striking REM-predominant hypnogram on overnight polysomnography, wherein multiple physiologic and behavioral contributors highlight the importance of detailed history taking.

Report of case(s): A 57-year-old woman with a past medical history of MDD on desvenlafaxine, untreated moderate obstructive sleep apnea due to CPAP intolerance, and fibromyalgia was referred for nonrestorative sleep. Medications included as-needed lorazepam 1 mg for sleep onset insomnia and amphetamine-dextroamphetamine 20 mg twice a day for persistent daytime somnolence. Diagnostic polysomnography demonstrated a significantly elevated proportion of REM sleep (58.7%) with 224.5 minutes of REM sleep within 382.5 minutes of TST. REM latency was 53.5 minutes with multiple REM periods noted. Sleep latency was 6.5 minutes. Apnea-Hypopnea Index (AHI) was 27.6 events per hour. Retrospectively, the patient reported that she did not take lorazepam or her afternoon dose of amphetamine-dextroamphetamine on the night of the study. She endorsed stable MDD but substantial psychological stress in the weeks leading up to polysomnography and the demise of her significant other shortly after the study. No acute sleep deprivation was reported.

Conclusion: We postulate that intermittent stimulant use, significant psychological stress, and underlying MDD likely interacted to increase REM pressure in our patient. Stress physiology is an important yet under-recognized modulator of REM sleep. Mellman et al. reported that individuals who exhibited a robust REM rebound after traumatic events were less likely to develop PTSD than subjects with fragmented, short REM episodes. Suchecki et al. hypothesized that acute stress-induced serotonin release increases adrenocorticotrophic hormone (ACTH) levels in the arcuate nucleus, with downstream metabolism into corticotropin-like intermediate lobe peptide, a significant inducer of REM sleep. These mechanisms indicate that stress-related pathways may augment classical causes of REM rebound, highlighting, as illustrated in our case, the need for careful history taking to identify multifactorial influences when interpreting REM rebound on polysomnography.

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1350

MASKING THE CHALLENGE: EVALUATING NASAL VS. ORONASAL APPROACHES IN OSA TREATMENT

Candace Miyaki¹, Victoria Wang¹, Ashwini Bandi², Adishi Ranjan³, Uriet Dewan⁴, Antara Mallampalli¹, Supriya Singh¹

¹Baylor College of Medicine, ²University of Texas, Houston,

³University of Central Florida, ⁴University of St. George's University

Introduction: Obstructive Sleep Apnea (OSA) is a prevalent condition characterized by recurrent upper airway obstruction during sleep. Traditional Positive Airway Pressure (PAP) therapy is not effective for all patients, highlighting the need for alternative treatment strategies. This case series investigates the efficacy of nasal versus oronasal masks in mitigating airway obstruction during Drug-Induced Sleep Endoscopy (DISE).

Report of case(s): We evaluated ten patients who had experienced failure with PAP therapy and were undergoing DISE to explore alternative treatment options for OSA. During DISE, we applied the previously prescribed PAP pressures using both oronasal and nasal masks. Additionally, we administered oxymetazoline to assess its effect on nasal passage patency. Airway obstruction was assessed using the Velum, Oropharynx, Tongue and Epiglottis (VOTE) classification system. The depth of sedation with propofol was tracked using the Bispectral Index (BIS). The masks were applied gently without strapping to minimize their impact on airway collapse. Our findings indicated that nasal masks were more effective than oronasal masks in relieving obstruction at the levels of the oropharynx and tongue base under therapeutic pressures. Notably, all patients were not mouth breathers, making chin lifts or chin straps unnecessary. Both the nasal and oronasal masks resulted in comparable expansion of the velum; however, the nasal masks demonstrated a significant improvement in the opening of the hypopharynx and the base of the tongue, effectively alleviating collapse in these areas. In contrast, even when unstrapped, the oronasal mask led to a notable worsening of collapse at the base of the tongue, often nearly completely obstructing the airway. No significant difference was observed in nasal passage patency with oxymetazoline.

Conclusion: CPAP delivered via nasal masks demonstrated superior efficacy over oronasal masks in alleviating airway obstruction in patients with OSA when observed under DISE conditions, particularly at the level of hypopharynx and base of the tongue. This potential for worsened upper airway collapse may be a contributor to many patients' complaints of feeling claustrophobic with the full-face masks and should be taken seriously in the choice of PAP interface. Our findings support the need for tailored treatment approaches to enhance outcomes for patients with OSA.

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1351

SECONDARY NARCOLEPSY AFTER ELECTROCUTION AND CHRONIC PAIN: INSIGHTS INTO SLEEP-WAKE DYSREGULATION AFTER A DECADE OF DIAGNOSTIC DELAY

Maithily Patel¹, Rupan Deep Kaur¹, Vinita Vaidya², Sreekartthik Athiyaman³, Vishal Deepak⁴

¹WVU Wheeling Hospital, ²WVU Medicine Ruby Memorial Hospital, ³NYMC at St. Mary's and St. Clare's Health, ⁴West Virginia University Hospital

Introduction: Excessive daytime sleepiness (EDS) is frequently attributed to sleep-disordered breathing, yet narcolepsy, particularly secondary narcolepsy after traumatic brain injury (TBI) is often overlooked. High-voltage electrocution can damage hypothalamic orexin-producing neurons, impairing sleep-wake regulation. Chronic pain further contributes to sleep fragmentation and non-restorative sleep. We present a case of secondary narcolepsy diagnosed more than a decade after severe electrocution, despite multiple prior sleep studies focused primarily on obstructive sleep apnea (OSA).

Report of case(s): A 73-year-old male with a history of 2,300-V electrocution (in 2001) and chronic diffuse pain reported worsening daytime sleepiness and fatigue. He had undergone 4-5 prior sleep studies, including a 2006 PSG showing mild, position-dependent OSA (AHI 3.8 overall; 6.4 supine). A more recent PSG demonstrated nocturnal hypoxemia (SpO₂ ≤88% for 40 minutes) but did not explain persistent symptoms. Extensive evaluation for chronic dyspnea and fatigue-including cardiology workup and intervention did not yield improvement. In 2025, the patient completed a two-week sleep diary followed by polysomnography (PSG) and multiple sleep latency testing (MSLT). The 2025 MSLT demonstrated a mean sleep latency of 7.5 minutes with two sleep-onset REM periods (SOREMs), consistent with secondary narcolepsy without cataplexy (Narcolepsy Type 2). The accompanying PSG showed no clinically significant OSA. After more than 10 years of hypersomnolence, chronic pain, and repeated diagnostic evaluations focused on OSA, the patient was finally diagnosed with narcolepsy.

Conclusion: This case highlights the importance of considering secondary narcolepsy in patients with a history of electrocution or TBI, particularly when chronic pain and persistent EDS co-exist. Early use of PSG, followed by MSLT may prevent years of functional impairment and diagnostic delay. Increased awareness of narcolepsy in post-injury populations is essential for timely identification and treatment.

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1352

TREATMENT CONSIDERATIONS IN CO-MORBID SCHIZOPHRENIA AND NARCOLEPSY: A CASE REPORT

Mai Malkin¹, Weam Sieffien¹, Matthew Gazzellone², Zachary Adirim¹, Brian Murray¹, Kenya Costa-Dookhan¹, Laura Rivera¹, Charles Choi¹, Lucas Robinson¹, Ibrahim Albawardi¹, Tracy Sarmiento¹, Royi Gilad¹, Benoit Mulsant¹, Michael Mak¹

¹University of Toronto, ²Mackenzie Health

Introduction: Narcolepsy affects approximately 1 in 2000 people and causes disabling sleepiness. Schizophrenia affects 1 in 133 people and confers significant impairments across domains. Rates of co-occurrence are not exactly known. One cohort study observed 8.1% of persons with narcolepsy (PWN) as having a psychosis comorbidity and a 4-fold greater risk for psychosis in PWN. Some wakefulness promoting medications used in narcolepsy treatment, such as modafinil, methylphenidate and amphetamine, may exacerbate psychosis by increasing dopamine

activity. There are case reports of sodium oxybate exacerbating psychosis. We explore a case of a patient with co-morbid narcolepsy and schizophrenia, and discuss the treatment considerations encountered.

Report of case(s): A 21-year-old man with was admitted for auditory hallucinations and bizarre behaviour. He put his cell phone in his microwave to prevent his conversations from being overheard. He was diagnosed with schizophrenia. The patient had a polysomnographic confirmed diagnosis of narcolepsy with cataplexy that predated this by 9 years. His methylphenidate extended-release 20mg was discontinued for concerns that it was precipitating psychosis. He was previously intolerant to modafinil (emotional numbing) and Concerta (appetite suppression) as per chart review. Paliperidone was effective for psychosis but worsened sleepiness, which was disabling. A retreat of modafinil worsened auditory hallucinations and delusions of persecution, and discontinued. He was discharged on paliperidone IM with well-controlled psychosis but sleepiness remained.

Conclusion: As an outpatient, caffeine 100mg up to 4x per day PRN was trialed but insufficient in promoting improvements to wakefulness. A new pitolisant was successful in treatment without exacerbation of psychosis. Unfortunately, after 8 weeks of treatment, the patient lost access to pitolisant for one month due to insurance coverage issues, during which his irresistible sleepiness and cataplexy returned. The pitolisant was restarted upon insurance approval, and his wakefulness and cataplexy again improved. He remains stable on pitolisant 40mg and paliperidone 75mg IM q4 weekly. He has residual but non-disabling sleepiness. In conclusion, some traditional stimulants may worsen psychosis in PWN. Pitolisant, an inverse H3 agonist, which does not theoretically affect dopamine pathways, may be a suitable treatment for sleepiness and cataplexy in comorbid psychosis.

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1353

MANAGEMENT OF SARS-COV-2 ASSOCIATED NARCOLEPSY TYPE 1 IN A US AIRFORCE (USAF) PILOT

Donald Ohima¹, Jennifer Creamer¹, John Werner¹, Brian O'Reilly², Cristah Prost¹, Sharmeela Kuperan¹

¹Walter Reed National Military Medical Center, ²Madigan Military Medical Center

Introduction: Narcolepsy Type 1 (NT1) is associated with immune-mediated loss of lateral hypothalamus hypocretin neurons. Several cases of NT1 diagnoses related to autoimmune diseases, H1N1 infection, and influenza vaccination are reported. One published case of NT1 associated with SARS-CoV-2 infection reports partial symptomatic improvement on modafinil and venlafaxine. This case describes the diagnosis and treatment of the first published CSF-confirmed case of NT1 with severe cataplexy following SARS-CoV-2 infection.

Report of case(s): A 30-year-old M Pilot with no previous history of excessive daytime sleepiness (EDS) presented with URI symptoms and tested positive for SARS-CoV-2 infection. Over the subsequent 7 months, despite sleeping 7-8 hours nightly, he developed rapidly progressive EDS including falling asleep while flying, frequent (5-10 episodes/day) cataplexy, sleep paralysis, and hypnagogic/hypnopompic hallucinations. Hypersomnia evaluation demonstrated an apnea-hypopnea index of 6.2 on

overnight polysomnogram with a next day mean sleep latency of 3.6 minutes with 4/5 sleep onset REM periods. Human leukocyte antigen haplotype showed heterozygosity for DQB1*06:02. CSF analysis revealed Orexin-A at < 50pg/mL. Trials of modafinil 400 mg, armodafinil 150 mg, venlafaxine 75 mg, and as-needed methylphenidate resulted in mild improvement in EDS and improvement of cataplexy but caused anxiety and palpitations. Weaning medications to achieve monotherapy with pitolisant 36.5mg caused status cataplecticus (15-20 episodes/day) with no improvement in EDS. Addition of venlafaxine significantly reduced cataplexy. Long acting (LA) sodium oxybate 7.5 mg, venlafaxine 150 mg po bid, and LA methylphenidate 30 mg ultimately controlled EDS and reduced cataplexy to an acceptable level.

Conclusion: This case describes the onset and therapeutic course of a patient with SARS-CoV-2 associated NT1. It is difficult to generalize from a single case, particularly given the atypical severity of patient's cataplexy. Thus, future studies will be needed to confirm if pitolisant is ineffective in SARS-CoV-2 associated NT1 cases and if multimodal therapy is always required.

Support (if any): The views expressed herein are those of the authors and do not reflect the official policy of the Department of War or U.S. Government.

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1354

“NARCOLEPSY PREPARED ME FOR MOTHERHOOD”: CONTINUOUS SODIUM OXYBATE USE IN PREGNANCY AND LACTATION WITH SAFE MATERNAL AND INFANT OUTCOMES

Zainab Al-Tameemi, Ravi Aysola
UCLA

Introduction: Evidence to guide the management of narcolepsy during pregnancy and lactation is extremely limited, particularly regarding the safety of sodium oxybate, and existing literature is sparse, suggesting no clear teratogenicity, but highlights theoretical neonatal sedation and recommends timed breastfeeding. Women with narcolepsy frequently face overlapping physiologic, occupational, and psychosocial pressures during pregnancy and the postpartum period, yet few contemporary case reports describe real-world maternal and neonatal outcomes. This case presents a rare, detailed longitudinal description of continuous sodium oxybate exposure throughout pregnancy, temporary postpartum discontinuation, and structured reintroduction during breastfeeding, with healthy maternal and infant outcomes.

Report of case(s): This is a 31-year-old woman with narcolepsy type 1, controlled on sodium oxybate 6 g nightly, who continued therapy throughout pregnancy following multidisciplinary counseling and shared decision-making. Her care team included maternal-fetal medicine, sleep medicine, anesthesiology, psychiatry, lactation consultants, and neonatal specialists, alongside strong family support. She also worked in a high-pressure executive role requiring sustained vigilance, rapid processing, and complex reasoning, making stable alertness essential for occupational functioning. Pregnancy, delivery, and neonatal course were uncomplicated, and the infant exhibited no sedation, withdrawal, or respiratory concerns. Sodium oxybate was withheld approximately 48–60 hours before delivery. Postpartum, she remained off medication for 12 weeks to exclusively breastfeed, describing the

experience as: “Narcolepsy prepared me for motherhood; being sleep deprived without medication is the exact same as having a newborn.” She later resumed sodium oxybate while breastfeeding using a structured pump-and-feed schedule. The infant demonstrated normal growth and development through three years of follow-up. After consent, data were collected through chart review and a structured follow-up interview.

Conclusion: With individualized assessment, coordinated multidisciplinary management, and precise feeding/dosing planning, sodium oxybate may be safely continued during pregnancy and reintroduced during lactation for select patients with narcolepsy, demonstrating feasibility when aligned with the medication's short half-life and supported by expert monitoring. This case is a rare, detailed real-world evidence supporting shared decision-making and underscores the urgent need for systematic research on sodium oxybate use during pregnancy, delivery, and breastfeeding.

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1355

SODIUM OXYBATE-ASSOCIATED CENTRAL SLEEP APNEA IN IDIOPATHIC HYPERSOMNIA

Troy Cisneros, Punithavathy Vijayakumar
University of Michigan

Introduction: It is estimated that as many as 50% of patients with Idiopathic Hypersomnia (IH) have Obstructive Sleep Apnea (OSA). Treatment of IH and OSA becomes complex due to overlapping symptoms. We present a case of a patient with a history of OSA and IH who developed treatment-emergent Central Sleep Apnea (CSA) after initiation of low-sodium oxybate therapy while on PAP therapy.

Report of case(s): A 37-year-old female with a history of IH and OSA presented for evaluation of persistent hypersomnia despite adherent CPAP use, low-sodium oxybate, and stimulant therapy. The patient was diagnosed with IH in adolescence, and hypersomnia was well-controlled with stimulant therapy. Years later, after significant weight gain, OSA was diagnosed and treated with auto-adjusting CPAP. She experienced a gradual worsening of hypersomnolence despite control of OSA on CPAP and was trialed on other stimulants, which were ineffective. The patient was subsequently started on low-sodium oxybate therapy, which moderately improved hypersomnia symptoms. After initiation of therapy, PAP-generated AHI was noted to be elevated with predominantly central apneas, which was not present on prior sleep studies or PAP reports. She completed 2 separate unsuccessful titration studies in which CPAP, BPAP, and BPAP-ST were ineffective at controlling central events. Patient is planned for ASV titration and possible reduction in low-sodium oxybate dose.

Conclusion: The ongoing hypersomnia and central sleep apneas may be associated with sodium oxybate and/or CPAP therapy. This poses a challenge to management as a reduction in the dose of sodium oxybate might worsen hypersomnia. Our case emphasizes the importance of evaluating the complex treatment needs of patients with IH and coexisting OSA who develop treatment-emergent central sleep apnea and persistent hypersomnia while using low-sodium oxybate and PAP therapy.

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1356

HYPERSOMNIA OF CENTRAL ORIGIN: SEQUELAE OF ANEURYSMAL RUPTUREChris Kocar¹, Talha Memon², Neeraj Kaplish³, Vivian Thai¹, Montserrat Montesinos², Sunitha Nune², Akber Sheikh¹¹Southwest Healthcare MEC, ²Complete Sleep Solutions,³University of Michigan

Introduction: Excessive daytime sleepiness (EDS) may occur due to insufficient sleep, sleep apnea, or primary central disorders of hypersomnolence. However, EDS may also occur following neurologic injury. Sleep-wake disturbances following subarachnoid hemorrhage (SAH) have been reported, yet missed in clinical practice. We present a case of severe hypersomnia following aneurysmal SAH complicated by persistent hydrocephalus with well-controlled obstructive sleep apnea (OSA).

Report of case(s): 40-y/o male with hypertension, hyperlipidemia, and OSA on CPAP was referred for evaluation of profound hypersomnia following aneurysmal SAH one year prior, complicated by hydrocephalus. Neurosurgery recommended shunt placement, but the patient declined. After the SAH he had unrefreshing sleep, difficulty sustaining wakefulness, and unintentional dozing with functional impairment. Epworth Sleepiness Scale score was 15. OSA was effectively treated at 10 cm of water with PAP-generated AHI of 1.4. He denied using sedating prescription or over-the-counter medications. He underwent Multiple Sleep Latency Test (MSLT) preceded with PSG on CPAP at home setting. PSG documented a total sleep time of 466 minutes, with sleep architecture including N1 2.9%, N2 65.9%, N3 19.0%, and REM 12.2% (REM latency 125 minutes). MSLT demonstrated severe hypersomnia with sleep occurring in all five nap opportunities with a mean sleep latency of 2.5 minutes. One sleep-onset REM period (SOREMP) occurred (REM latency 12.5 minutes) in nap 1. In the context of SAH with persistent hydrocephalus and adequately treated OSA, findings supported a diagnosis of secondary hypersomnia likely related to post-hemorrhagic disruption of hypothalamic/brainstem arousal networks and associated neurophysiologic dysregulation.

Conclusion: This case underscores the importance of considering secondary neurologic causes of hypersomnolence. SAH, particularly when complicated by hydrocephalus, may disrupt central arousal systems and produce clinically significant hypersomnolence with severity similar to narcolepsy. Mechanistic support has been described in SAH cohorts reporting orexin/hypocretin abnormalities, including reported lower hypocretin-1/orexin-A levels following the SAH event, which may persist in some cases. Objective evaluation with PSG/MSLT may confirm pathological sleepiness, avoids diagnostic anchoring on treated OSA, and supports collaborative management and counseling regarding potentially modifiable contributors, including hydrocephalus.

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1357

CLINICAL CROSSROADS: THE DILEMMA BETWEEN IDIOPATHIC HYPERSOMNIA AND NON-HYDROCEPHALIC SYMPTOMATIC PINEAL CYST SYNDROME

Roberto Cardona Quinones, Mark Knobel, Andreas Charidimou

Boston VA Healthcare System/ Boston University School of Medicine

Introduction: The diagnostic process in clinical practice is complex. Many diagnoses rely on objective, quantifiable findings, while others are reached only after excluding all other reasonable explanations. Challenges arise when a diagnosis of exclusion is made but remains uncertain or contested, especially when a condition that is not well established may represent the true underlying diagnosis. In this discussion, we present the case of a patient who met the diagnostic criteria for idiopathic hypersomnia (IH); however, the suitability of this diagnosis is challenged by the possibility that Non-Hydrocephalic Symptomatic Pineal Cyst Syndrome (nhSPCS) may better explain the clinical presentation. Despite emerging evidence, nhSPCS remains a condition that is not well established.

Report of case(s): A 25-year-old woman with no notable medical history presented with three years of excessive daytime sleepiness (despite 13-16 hours of sleep daily), lightheadedness, restless sleep, and cognitive difficulties. The patient was evaluated with PSG and MSLT, revealing short sleep latency (4 minutes) but no sleep onset REM or evidence of narcolepsy. The findings supported IH after other medical causes, were excluded. Neurology was consulted due to concerns for migraine-like symptoms, dizziness, fatigue, nausea, vomiting, fainting, and possible vasovagal syncope. Neurological exam was intact, but brain MRI revealed a 1.7x0.8x1 cm pineal gland cyst with calcifications and minor hemorrhagic features, but no hydrocephalus. Differential diagnoses included pineocytoma or pineal cyst, possibly suggesting nhSPCS as a potential explanation for the patient's hypersomnia and other symptoms unrelated to sleep.

Conclusion: This case highlights the critical need for maintaining diagnostic flexibility when assessing central disorders of hypersomnolence. While idiopathic hypersomnia is typically a diagnosis of exclusion, the presence of coexisting structural abnormalities, such as a considerable large, complex pineal cyst, should prompt clinicians to reconsider the presumed etiology of hypersomnolence. Recognizing the potential overlap between IH and nhSPCS may enhance diagnostic accuracy, inform more targeted treatment strategies, and mitigate the risk of misattributing symptoms to isolated sleep pathology when a broader neuroanatomical process may be involved. Although the diagnosis of nhSPCS remains a subject of debate, this case may contribute to a better understanding of its symptoms and improve the assessment of sleep disorders.

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1358

DIAGNOSTIC VALUE OF 24-HOUR POLYSOMNOGRAPHY IN SUSPECTED IDIOPATHIC HYPERSOMNIA: A FOUR-CASE SERIESAnant Shukla¹, Blessen George², Parvati Singh¹, Jacqueline Geer¹¹Yale New Haven Hospital/Yale University, ²Yale School of Medicine

Introduction: Idiopathic hypersomnia (IH) is difficult to diagnose because standard polysomnography (PSG) and the multiple sleep latency test (MSLT) have limited sensitivity and poor test-retest reliability. Many patients with clinically suspected IH have nondiagnostic MSLT results. Objective diagnostic criteria include

either a mean sleep latency ≤ 8 minutes with ≤ 1 Sleep Onset REM Period (SOREMP) on MSLT or a total sleep time (TST) > 11 hours documented by 24-hour PSG or by actigraphy with sleep diary under unrestricted sleep conditions. Standard overnight PSG often does not capture prolonged sleep duration, and extended sleep recordings have emerged as useful adjuncts when routine testing is inconclusive. We present four cases in which 24-hour PSG clarified the diagnosis in patients with suspected IH despite nondiagnostic MSLT results.

Report of case(s): We describe four females aged 20–41 years evaluated for suspected IH with standard overnight PSG and MSLT. Because these initial studies were nondiagnostic and clinical suspicion for IH remained high, each patient subsequently underwent a 24-hour PSG. Overnight PSG findings showed TSTs ranging from 375.0 to 500.0 minutes and REM latencies of 91.0–133.5 minutes. All four MSLTs were nondiagnostic, with mean sleep latencies of 10.1–16.0 minutes and 0–2 SOREMPs, failing to meet objective IH criteria. In contrast, 24-hour PSG demonstrated substantially prolonged sleep duration in every case, with TSTs of 738.0, 714.0, 687.0, and 930.0 minutes and extended REM latencies. These recordings revealed total sleep times exceeding the threshold supportive of IH and provided diagnostic clarity not captured by routine PSG and MSLT testing.

Conclusion: Across these cases, standard PSG and MSLT were nondiagnostic, whereas 24-hour PSG consistently revealed prolonged sleep duration meeting objective IH criteria. These findings support incorporating extended sleep recordings into the diagnostic evaluation of suspected IH, particularly in patients whose symptoms strongly suggest IH but whose routine studies are inconclusive. By providing an objective measure of total sleep time, 24-hour PSG can enhance diagnostic accuracy and better align objective testing with clinical presentation.

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1359

PUTTING THE L AND S IN KLS: LITHIUM AND STEROIDS IN ADULT-ONSET KLEINE-LEVIN SYNDROME

Nicholas Shaffer, Mauro Alberto Mendez Baylon
Baylor College of Medicine

Introduction: Kleine-Levin syndrome (KLS) is a relapsing-remitting hypersomnia characterized by episodic hypersomnolence, cognitive impairment, and behavioral change. Adult-onset cases are rare and may be difficult to distinguish from other neurologic, psychiatric, or sleep-related conditions.

Report of case(s): A 39-year-old man developed abrupt hypersomnia shortly after a presumed viral respiratory illness in early 2023. Prior to treatment, he experienced 4–5 episodes per year, with major episodes lasting up to 8 weeks, accompanied by sleeping 18–20 hours per day, profound confusion, derealization, dysarthria, slowed cognition, anorexia, vomiting, and gait instability requiring a cane. These prolonged episodes produced major functional impairment affecting cognition, mobility, independence, and employment. Between episodes, he reliably returned to his baseline level of cognitive and functional functioning. Diagnostic evaluation revealed no alternative etiology. Brain MRI demonstrated a small right frontal extra-axial meningioma without mass effect. Routine EEG capturing wakefulness and sleep onset was normal, with no epileptiform discharges. The cerebrospinal

fluid and serum studies were also unremarkable. Polysomnography identified mild obstructive sleep apnea with a central component, effectively treated with continuous positive airway pressure at 9 cm H₂O. Despite optimized therapy, he continued to experience recurrent hypersomnolence and cognitive episodes, confirming that sleep-disordered breathing did not account for the relapsing clinical course. Lithium was initiated for management of recurrent hypersomnia consistent with KLS. After initiation, he demonstrated a dramatic therapeutic response: episodes became far less frequent and shortened to ~ 10 days, with a reliable return to baseline between episodes. The patient received approximately six periodic 3-day courses of intravenous methylprednisolone during prolonged episodes, each associated with accelerated symptom resolution, as well as one oral corticosteroid course when intravenous therapy was unavailable. In 2025, he experienced only two brief episodes, each markedly shorter than his pre-treatment baseline. The magnitude of improvement observed in this patient is consistent with prior reports describing lithium-associated reductions in episode frequency and duration of ~ 30 –50% and corticosteroid-associated shortening of prolonged episodes by ~ 1 –2 weeks when administered early.

Conclusion: This case highlights adult-onset Kleine-Levin syndrome triggered by viral illness, persistent symptoms despite optimized CPAP therapy, and substantial improvement with lithium and corticosteroids.

Support (if any):

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1360

ACTIGRAPHY-SUPPORTED DIAGNOSIS OF KLEINE-LEVIN SYNDROME IN AN ADOLESCENT WITH RECURRENT HYPERSOMNIA

Liz Lezama¹, Kathy Chan¹, Sujith Modugula¹, Anna Wani²

¹The University of Texas Southwestern, ²Children's Health

Introduction: Kleine-Levin syndrome (KLS) is a rare, relapsing-remitting neurologic sleep disorder characterized by recurrent episodes of severe hypersomnia accompanied by cognitive, behavioral, and autonomic disturbances, with complete inter-episode recovery. It predominantly affects adolescent males. Diagnosis is frequently delayed because of its episodic nature, nonspecific symptoms, and lack of definitive biomarkers. Objective documentation of hypersomnia during symptomatic periods is challenging. Actigraphy offers a practical, noninvasive approach to capturing sleep-wake patterns during active episodes.

Report of case(s): A 16-year-old male presented with a nearly two-year history of recurrent hypersomnia episodes occurring every 2–3 months and lasting several days to weeks. During episodes, he slept 15–20 hours per day and exhibited hyperphagia and mild irritability as prodromal symptoms. Initial symptom onset followed multiple upper respiratory infections. Between episodes, he returned fully to baseline with normal sleep patterns and daytime functioning. Extensive medical evaluation was unrevealing. Epstein-Barr virus serology showed elevated IgG titers with negative PCR and low IgM levels, not felt to explain his presentation. Evaluation for Marfan syndrome, primary immunodeficiency, autoinflammatory and autoimmune disorders, and immunologic abnormalities was normal. Neurologic workup, including head CT, brain MRI, and EEG, was unremarkable. Wrist actigraphy performed during a symptomatic episode demonstrated markedly prolonged total sleep time, reduced daytime wakefulness, and

disrupted circadian organization. Subsequent polysomnography revealed mild obstructive sleep apnea. A multiple sleep latency test was not consistent with narcolepsy (mean sleep latency 9 minutes, two sleep-onset REM periods). These objective findings, in conjunction with the characteristic clinical course and exclusion of secondary causes, supported a diagnosis of Kleine-Levin syndrome.

Conclusion: This case highlights the clinical utility of actigraphy as an accessible and objective tool for documenting hypersomnia during acute KLS episodes. While polysomnography may be logistically difficult during symptomatic periods, actigraphy allows longitudinal assessment of sleep–wake patterns and can aid in distinguishing KLS from other hypersomnia disorders, mood disorders, and behavioral sleep disturbances.

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1361

IMPROVEMENT OF NON-24-HOUR SLEEP–WAKE DISORDER WITH TASIMELTEON IN A LEGALLY BLIND ADOLESCENT: A CASE REPORT

Makayla Cox¹, Kevin Kaplan²

¹Baylor College of Medicine, ²Texas Children's

Introduction: Non-24-hour sleep–wake disorder (N24SWD) is a circadian rhythm disorder characterized by a progressively shifting sleep schedule that fails to align with the 24-hour day. It occurs most frequently in blind individuals who, due to a lack of environmental light stimulus, are unable to maintain a regular circadian rhythm. Tasimelteon, a melatonin-receptor agonist (MT1/MT2), is FDA-approved for treatment of N24SWD in blind adults, but data in pediatric patients remains limited. We present a case of a legally blind adolescent with chronic insomnia and actigraphic evidence of circadian dysregulation who demonstrates significant clinical improvement after initiation of Tasimelteon.

Report of case(s): A 13-year-old male with a history of extreme prematurity, bilateral hearing impairment, legal blindness, and developmental delay presents with chronic sleep concerns. He previously followed neurology and had been treated for chronic insomnia with trazodone 25 mg, melatonin 5 mg, and clonidine 0.2 mg nightly. Despite this regimen, he fell asleep around 9:30–10:00 PM but experienced multiple nocturnal awakenings at 1:00 AM and 3:00 AM, achieving only ~5 hours of total sleep. Actigraphy was obtained to evaluate N24SWD. Over 5/27/21–6/7/21, average bedtime was 9:47 PM (range 6:16 PM–2:38 AM), wake time 7:56 AM (range 4:26 AM–11:12 AM), and total sleep time 8 h 55 m (range 5 h 36 m–13 h 11 m), demonstrating significant variability consistent with circadian rhythm disturbance. Melatonin timing was adjusted, and trazodone was increased to 50 mg with partial benefit. Tasimelteon was initiated in place of melatonin, followed by tapering of trazodone and reduction of clonidine to 0.1 mg. Within one week of starting Tasimelteon, the patient showed marked improvement in sleep consolidation and circadian stability, consistently sleeping from 9:00 PM to 7:00 AM (10 hours nightly). Improvements persisted, though with minor seasonal variation during school breaks.

Conclusion: This case highlights the potential efficacy of Tasimelteon in improving sleep continuity and achieving

circadian entrainment in a legally blind adolescent with N24SWD. Tasimelteon may represent a safe and effective therapeutic option for pediatric patients with significant visual impairment and circadian rhythm disorders.

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1362

BEHAVIORAL INTERVENTION FOR NON-24 HOUR-SLEEP-WAKE DISORDER IN A SIGHTED ADOLESCENT: A CASE REPORT

Francisco Vizcaino¹, Raegan Atha², Susan Calhoun³, Julio Fernandez-Mendoza⁴

¹Penn State Health St. Joseph's Medical Center, ²Penn State Health Sleep Research & Treatment Center, ³Penn State Health, ⁴Penn State University, Hershey

Introduction: Non-24-hour sleep–wake disorder (N24SWD) is characterized by a progressive daily drift of the circadian rhythm relative to the 24-hour light–dark cycle. While commonly associated with total blindness, N24SWD is rare among sighted individuals and even less frequently reported in adolescents, where it contributes to functional impairment, social withdrawal, and academic decline. We present a sighted 18-year-old with autism spectrum disorder (ASD) and severe sleep–wake drift who was successfully entrained using behavioral chronotherapy combined with light and melatonin interventions.

Report of case(s): An 18-year-old male with ASD and social anxiety presented with progressively delayed sleep onset and offset, excessive daytime sleepiness, and significant school absenteeism. Baseline assessments showed ISI 17, PSAS-C 22, ESS 11, and MEQ 5. Sleep diaries demonstrated a ~2-hour daily phase delay, with sleep onset drifting from 22:00 to 16:00 over ten days, consistent with N24SWD in the absence of other sleep disorders. Treatment began with anchoring wake time at 12:00 for three days to relieve sleep debt, combined with evening light avoidance (00:00–04:00) and morning light exposure (12:00–13:00). The patient then undertook structured chronotherapy by delaying his sleep schedule by 120 minutes each day until achieving the target 23:00–07:00 sleep–wake schedule. Once stable, he introduced low-dose melatonin (1 mg) at 19:00, timed approximately two hours before estimated dim-light melatonin onset. Additional interventions included sleep restriction, stimulus control, blue-light blocking in the evening, and constructive worry techniques. At three weeks, his schedule stabilized between 23:00 and 07:30 with persistent increased sleep need. At six weeks, he maintained a consistent 23:00–08:00 schedule with sleep efficiency of 97.1%, ISI 4, PSAS-C 13, and ESS 7. Functionally, daytime alertness and work participation improved, with no adverse effects occurring throughout treatment.

Conclusion: N24SWD should be considered in sighted adolescents with continuous sleep–wake drift. In this case, circadian entrainment was successfully achieved using a structured behavioral and chronobiologic approach combining chronotherapy, timed light exposure, evening light restriction, and low-dose melatonin. Effective alignment of circadian phase resolved insomnia-like symptoms and improved daytime functioning.

Support (if any): None

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1363

FREE RUNNING: A CASE REPORT OF NON-24 HOUR SLEEP WAKE DISORDER IN A SIGHTED TRANSGENDER ADULTNicholas Moore, Randa Zayed
University of Utah Health

Introduction: Non-24 Hour Sleep Wake Disorder (N24SWD) is rarely observed among sighted individuals. The diagnostic criteria can be summarized as progressive daily delays in sleep-wake timing documented by sleep diaries or actigraphy for at least 14 days, with symptoms persisting for ≥ 3 months and sleep disturbance not better explained by another condition. Limited literature describes circadian rhythm disorders in transgender populations. We present the first documented case of N24SWD in a sighted transgender patient on gender-affirming hormone therapy.

Report of case(s): 32-year-old transgender woman on gender affirming hormone therapy (Estradiol) with psychiatric and neurodevelopmental comorbidities including: anxiety, ADHD, autism spectrum disorder (ASD), depression, and chronic fatigue who presented for sleep medicine evaluation with complaints of progressive disrupted sleep since high school. She endorsed non-restorative sleep, daytime sleepiness, morning dry mouth, periodic nightmares, intermittent sleep paralysis and difficulty initiating as well as maintaining sleep. Actigraphy (14 days) showed irregular sleep timing with concern for progressive phase shift. Sleep logs were consistent with free-running, progressive nightly sleep delay (1-2 hours). Diagnostic polysomnography found mild obstructive sleep apnea (AHI 13.5/hour) and REM without atonia. Notable absence of dream enactment behavior. Patient started on auto-titrating CPAP with symptomatic improvement. Multimodal circadian intervention using morning bright-light exposure and scheduled melatonin (0.5–1 milligrams nightly) successfully entrained a stable sleep-wake pattern over time.

Conclusion: This case of sighted N24SWD does not have a clear root cause. The typical driver in sighted N24SWD is by behavioral and environmental misalignment. However, this patient also suffers from many risk factors associated with circadian rhythm interference including depression, neurodevelopmental disorders (ADHD, ASD), and current hormone therapy. This case highlights the need for better understanding of sighted N24SWD and other circadian rhythm disorders in the context of transgender populations, particularly in the setting of hormone therapy and neurodevelopmental vulnerability.

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1364

AN UNEXPECTED DIAGNOSIS FOR PERSISTENT HYPERSOMNIA WITH A WEARABLE CONSUMER HEALTH TRACKERKathy Chan¹, Liz Lezama¹, Sujith Modugula¹, Nora Bismar², Won Lee²¹University of Texas Southwestern, ²UT Southwestern Medical Center

Introduction: An increasing number of wearable consumer health trackers (CHTs) for sleep are being used by patients. Validation studies comparing CHTs to gold standard polysomnography (PSG)

are variable and inconsistent. In 2025, the World Sleep Society recommended pragmatic use of CHTs for sleep monitoring while understanding the limitations of the devices. We present a case of an unexpected diagnosis for hypersomnia found with a CHT.

Report of case(s): A 61-year-old male with a history of type 1 narcolepsy, severe obstructive sleep apnea (OSA) on bilevel positive airway pressure (BiPAP), restless leg syndrome, hypertension, and right hemidiaphragm paralysis presented with persistent hypersomnia. Despite being 100% compliant with BiPAP and on a sodium oxybate for narcolepsy and gabapentin for RLS control, he continued to have excessive daytime fatigue causing an inability to remain employed and multiple motor vehicle accidents. He had trialed multiple wake-promoting agents, but each led to significant side effects requiring discontinuation. A two-week sleep diary (Figure 1) was consistent with an irregular sleep-wake cycle rhythm disorder. While adjusting his medications and optimizing his sleep schedule, he began to wear a CHT. He was able to makeshift the battery so he could track his sleep-wake cycle continuously. Data from his CHT was consistent with a non-24 circadian rhythm disorder (Figure 2). He was started on tasimelteon, a melatonin MT1 and MT2 receptor agonist, daily. Subsequent CHT data showed resolution of his non-24 circadian rhythm disorder (Figure 3) with improvement of his daytime hypersomnia symptoms.

Conclusion: Wearable CHTs can provide informative data on sleep-wake cycle and sleep architecture. However, accuracy of this data can vary from device to device. Often data from CHTs are incidentally presented to providers; providers should be aware of limitations of these devices when utilizing the data clinically. Limitations of CHTs include detecting exact wake-sleep transition, accuracy of sleep staging, limited regulation of devices, and limited understanding of underlying proprietary algorithms interpreting raw data. Despite these limitations, data from CHTs can be clinically useful, as in this patient. Providers are recommended to focus on trends and patterns from CHTs and remain up to date in evolving best practice recommendations for use.

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1365

NAVIGATING MARIJUANA WITHDRAWAL: A DIAGNOSTIC DILEMMA IN MSLT INTERPRETATION

Sandeep Banga, Brooke Judd

Dartmouth Hitchcock Medical Center, Sleep Disorders Center

Introduction: Limited prior studies and case reports have assessed the effects of marijuana use and withdrawal on sleep architecture, including alterations in REM sleep. In particular, these have suggested an increase in REM and reduction in REM latency with abrupt discontinuation of chronic marijuana use. This case report examines a patient with suspected narcolepsy type 1 and highlights how recent marijuana cessation may significantly influence Multiple Sleep Latency Test (MSLT) results, potentially leading to diagnostic misinterpretation.

Report of case(s): A 29-year-old female presented with non-restorative sleep, poor sleep quality, excessive daytime sleepiness requiring multiple daily naps, involuntary dozing, sleep paralysis, hypnagogic hallucinations, and possible cataplexy-like episodes. She disclosed daily marijuana use at the initial consultation visit. Home sleep apnea testing was non-diagnostic for obstructive

sleep apnea. Subsequently, the patient completed a two-week sleep diary, followed by in-laboratory polysomnography (PSG) and MSLT. Her sleep diary documented an average of 9 hours and 3 minutes of sleep per night, including daily napping. Overnight PSG demonstrated mild obstructive sleep apnea (AHI 8.2; CMS AHI 3.6) with adequate total sleep time of 6 hours and 44 minutes and no sleep-onset REM period was present. Testing proceeded to the MSLT, which was significantly abnormal, with rapid sleep onset on all naps leading to a mean sleep onset of 0.6 minutes. Notably, 5 sleep-onset REM periods were observed. The patient denied the use of medications that could influence test results. A urine drug screen performed between naps 3 and 4 was positive for marijuana, with a Delta-9 carboxy-tetrahydrocannabinol concentration of 10 ng/mL. The patient reported last using marijuana two days before the in-lab sleep studies.

Conclusion: The patient's MSLT findings may be confounded by the physiologic effects of marijuana withdrawal, particularly the potential for REM rebound. Although the clinical picture and objective results raise strong suspicion for narcolepsy type 1, the MSLT cannot be considered valid under these conditions. Repeat evaluation—including actigraphy and a sleep diary for two weeks, followed by repeat PSG and MSLT—is necessary. Critically, the patient must abstain from marijuana use for at least six weeks before repeat testing to ensure accurate assessment.

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1366

OPTIMAL MANAGEMENT OF NIGHTMARE DISORDER DUE TO MULTIFACTORIAL ETIOLOGIES IN A PATIENT WITH HYPERSOMNIA

James Hall¹, Mercy Azubuko-Uduh², Naomi Ghildiyal², Alok Pant², Minh Tam Ho², Cesar Liendo², Oleg Chernyshev³

¹Ochsner-LSU Health Shreveport Medical Center, ²Ochsner LSU Health Medical Center, ³LSU Health Sciences Center at Shreveport

Introduction: Nightmares are usually associated with insomnia but rarely can arise from distinct and overlapping etiologies that can result in hypersomnia. The etiologies that need to be considered would be PTSD, acute stress disorder, nightmare disorder, depression, anxiety, medication/substance effect, narcolepsy, Idiopathic Hypersomnia. Rare causes are intracranial mass lesion, CNS infections, and epilepsy.

Report of case(s): A 21-year-old Caucasian female with a history of morbid obesity, major depression, PTSD, and hypertension who presented with complaints of hypersomnia and constant drowsiness during the day. She reported that her daytime drowsiness started when she was around the age of 11 or 12 years old and needed 16 to 17 hours of sleep per day to function but continued to feel unrefreshed on waking up, raising concerns for narcolepsy without cataplexy versus idiopathic insomnia. She also suffers from frequent and recurring nightmares that started around the same age as her hypersomnia complaints with her nightmares occurring almost daily to every other day. This was worsened 2 to 3 years ago when she was a victim of sexual assault, and she is now experiencing more frequent and vivid nightmares related to this event. She is currently being treated by psychiatry for PTSD and depression with Lexapro 20 mg daily and prazosin to help manage

her nightmares. Increasing prazosin 1 mg at bedtime to 2 mg has reduced the intensity of the dreams. Unfortunately, nightmares continue to be a regular occurrence due to her hypersomnia and extended sleep times. A polysomnogram was performed followed by a multiple sleep latency test demonstrating a reduced sleep consistently less than 5 minutes but was negative for sleep onset REM confirming a diagnosis of idiopathic hypersomnia. Treatment of idiopathic hypersomnia using stimulants during the day leads to improvement in her quality of life.

Conclusion: The patient with multifactorial etiology for nightmare disorder benefited with treatment of the etiologies

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1367

HYPERSOMNIA IN A PATIENT WITH LANGERHANS CELL HISTIOCYTOSIS

Sandip Minhas¹, Elizabeth Record², Julia Aziz²

¹Children's National Hospital/George Washington University Program, ²Children's National Hospital

Introduction: Idiopathic hypersomnia (IH), hypersomnia due to a medical disorder, and Narcolepsy type II (NT2), including narcolepsy due to a medical disorder present with daytime sleepiness, excessive nocturnal sleep, and napping. These disorders lead to significant impairment in functioning and decreased quality of life. While there are treatments for IH and NT2, there are no medications yet approved for hypersomnia due to a medical disorder.

Report of case(s): A 19 year old female with neurodegenerative Langerhans Cell Histiocytosis (LCH), epilepsy, and ADHD presented for evaluation of excessive daytime sleepiness (EDS) (ESS 22) and symptoms of sleep disordered breathing, despite adequate nocturnal sleep and amphetamine/dextroamphetamine 50 mg. Exam was significant for somnolence and grade 4 tonsillar hypertrophy. PSG demonstrated moderate OSA (OAH1 17.2/hr). She was referred for T&A and started on PAP therapy in the interim, with adequate treatment at follow up. Other studies included brain MRI which showed thickening of the anterior hypothalamus due to LCH, and CSF studies with normal hypocretin level 388 pg/mL. Post operative PSG was normal (OAH1 0.9/hr) but there was no improvement in sleepiness (ESS 21). Actigraphy showed nocturnal sleep of 9.55 hours with daytime naps resulting in an average of 11.62 hours of sleep in 24 hours. MSLT showed sleep on 4/5 naps with average SOL of 9.6 minutes with 1 SOREMP. However, MSLT was invalid due to sleep between naps. Additionally, she was medically unable to wean from all REM suppressing medications (olanzapine and timolol). At this point our differential included IH, hypersomnia due to a medical disorder, and NT2 (possibly due to a medical disorder) with diagnosis masked by REM suppression. Our working diagnosis is IH based on actigraphy criteria but other conditions cannot be ruled out. She was started on 3 g once a night of calcium, magnesium, potassium, and sodium oxybates. After titrating to the final dose of 3.5g, the patient had dramatic improvement with her EDS (ESS 2).

Conclusion: This patient's diagnostic testing make a definitive categorization of her hypersomnia difficult, but the clinical picture was consistent with central disorder of hypersomnolence and she showed significant improvement with appropriate treatment.

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1368

UNLEASHING DREAMS: REM SLEEP WITHOUT ATONIA AS A HIDDEN BIOMARKER IN PEDIATRIC NARCOLEPSY WITH CATAPLEXY

Qaiser Patel, Darian Aboubakare, Meera Patel

Corewell Health William Beaumont University Hospital

Introduction: REM sleep without atonia (RSWA) is characterized by excessive muscle activity during rapid eye movement (REM) sleep on polysomnography (PSG), where normal physiologic muscle paralysis is absent. This finding can be incidental or associated with conditions like REM sleep behavior disorder (RBD), narcolepsy, or medication effects (e.g., SSRIs/SNRIs). It may predict neurodegenerative diseases but requires clinical correlation, as no dream enactment behavior confirms isolated RSWA. This case presents RSWA in a pediatric patient with narcolepsy and cataplexy, highlighting its diagnostic and management implications in young populations.

Report of case(s): A pediatric female presented for narcolepsy with cataplexy follow-up, reporting significant daytime sleepiness and attacks, improved on therapy. Symptoms included fragmentation, vivid dreams, rare paralysis/hallucinations, and emotion-triggered cataplexy (muscle weakness). Patient was taking SSRI for mood; with cataplexy improved but ongoing. Diagnostic PSG/MSLT confirmed narcolepsy: PSG showed borderline mild obstructive sleep apnea, sleep fragmentation, short REM latency, RSWA without observed enactment (patient-reported), PLMs with low ferritin and upper extremity movements. MSLT revealed short sleep latency, with multiple SOREMPs. Mild OSA was unlikely to be driving the sleepiness, and nasal treatments had been discontinued due to side effects. PLMs, which are often worsened by SSRI use and commonly seen in narcolepsy, were linked to low iron levels, although oral supplementation proved intolerable. Management involved discontinuing the stimulant due to side effects, starting a wake-promoting agent, uptitrating narcolepsy therapy, continuing the SSRI, and referral for iron infusion. Safety precautions were emphasized, including avoiding driving or heavy machinery, risks near water, heights, or fire, and parasomnia measures such as securing doors and objects. Mood support was provided through psychiatry and psychology follow-up, school accommodations were recommended, and OSA/PLMs were addressed via ferritin monitoring.

Conclusion: This case demonstrates RSWA as a supportive finding in pediatric narcolepsy with cataplexy, often alongside PLMs and short REM latency, emphasizing comprehensive PSG review. Integrated management, including pharmacologic adjustments, safety education, and multidisciplinary referrals, optimizes outcomes. It highlights the need for tailored approaches in young patients to mitigate diagnostic pitfalls and long-term risks.

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1369

SUCCESSFUL LONG-TERM MANAGEMENT OF REFRACTORY RESTLESS LEG SYNDROME WITH METHADONE

Megan Miranda, Deandra Kuruppu, Sanjay Kaji

University of Arizona College of Medicine Phoenix

Introduction: Refractory restless legs syndrome (RLS) presents significant management challenges, particularly when patients fail first-line dopaminergic agents, α -2- δ ligands, and combination therapy. Opioid therapy is recognized as an evidence-based option in severe refractory cases, yet long-term outcomes remain underreported. We present a case of complex, refractory RLS successfully managed with methadone after extensive medication intolerance and augmentation.

Report of case(s): A 56-year-old woman with chronic refractory RLS, chronic migraines, trigeminal neuralgia, hypertension, depression, ADHD, and insomnia had experienced years of disabling symptoms involving both nighttime and daytime periods. She previously failed all dopamine agonists, gabapentin, pregabalin, and experienced only partial relief with short-acting opioids. Kratom provided transient symptom reduction but caused limiting constipation. In April 2022, methadone was initiated after all standard therapies had been exhausted. Symptoms persisted with significant sleep disruption and severe daytime sleepiness (Epworth Sleepiness Scale [ESS] 23). By September 2023, her regimen was titrated to methadone 20 mg/day in divided doses plus gabapentin 1200 mg QHS during recovery from microvascular decompression for trigeminal neuralgia. Her RLS worsened markedly following knee surgery in September 2024, consistent with known postoperative exacerbations. She briefly used oxycodone for postoperative pain. Methadone was increased to 30 mg/day (10 mg evening, 20 mg bedtime), and gabapentin continued at 600 mg QHS and 300 mg QAM. She was counseled extensively on opioid safety and maintained naloxone at home. By July 2025, she reported a dramatic improvement. She slept over seven hours nightly—consistent for the first time in years—and no longer experienced daytime RLS symptoms. ESS improved to 7. She remained stable on methadone 10 mg QAM/20 mg QHS and gabapentin 300 mg QAM/600 mg QHS with excellent adherence confirmed by prescription monitoring. Her quality of life and functional status significantly improved, and she tolerated the regimen well.

Conclusion: This case demonstrates that methadone can provide substantial, sustained benefit in severe refractory RLS when other treatments fail. Careful titration, safety counseling, and ongoing monitoring enabled significant improvement in sleep, daytime function, and overall quality of life.

Support (if any): No external funding or support was received for this case report.

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1370

MULTIPLE SCLEROSIS ASSOCIATED RAPID EYE MOVEMENT SLEEP BEHAVIOR DISORDER

Vinita Kusupati, Jiyeon Seo, Oragun Rojanapairat

Cedars-Sinai Medical Center

Introduction: Rapid eye movement (REM) sleep behavior disorder (RBD) is a parasomnia characterized by muscle atonia during REM sleep and dream enactment behavior^{1,2}. RBD may be idiopathic, drug-induced, or secondary to other medical conditions. Idiopathic RBD is frequently associated with neurodegenerative disorders, while secondary RBD has been linked to genetic disorders, brainstem lesions, and conditions such as multiple sclerosis (MS)³. Sleep disorders are more frequent in patients with MS than in the general population⁴. We present a case of RBD in a patient with MS.

Report of case(s): A 44-year-old male with MS on natalizumab was referred for chronic insomnia, poor sleep, and excessive daytime sleepiness. He reported dream enactment behaviors two or three nights weekly, including jumping, running, and talking during sleep. A prior home sleep apnea test was negative for obstructive sleep apnea. Polysomnography with electromyography demonstrated REM sleep without atonia, confirming RBD. Previous brain magnetic resonance imaging revealed demyelinating lesions in the parietal/pericallosal white matter, periventricular left parietal white matter, and periventricular right temporal lobe, dorsal pons and dorsal medulla. The patient was counseled on bedroom safety and started on nightly melatonin and cognitive behavioral therapy for insomnia. At three-month follow-up, dream enactment behaviors had resolved and overall sleep quality improved.

Conclusion: Sleep disorders, including RBD, are common in MS and contribute to impaired quality of life through effects on pain, depression, and fatigue⁵. RBD is characterized by abnormal motor activity during REM sleep due to failure of muscle atonia. The pontine tegmentum and medial medulla play central roles in regulating this process. Demyelinating plaques in this region have been implicated in secondary RBD associated with MS⁷⁻¹¹. In this case, similar lesions likely contributed to the development of RBD. Treatment of RBD focuses on ensuring safety during sleep. Melatonin and clonazepam are first-line pharmacologic treatments for RBD in adults^{1,3,12}. In patients with RBD associated with MS, management of MS activity may improve RBD symptoms⁴. This case highlights the importance of recognizing RBD in patients with MS who report dream enactment or disrupted sleep, as early recognition and treatment can markedly improve safety and quality of life.

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1371

EMERGING SLEEP-RELATED MOVEMENT DISORDER: A CASE OF RESTLESS SLEEP DISORDER

Ryan Dunlow¹, Kelvin Jens Moncera², Nidhi Kotwal³, Thomas Fitzgerald³, Montserrat Diaz-Abad²

¹University of Maryland, Baltimore, ²University of Maryland School of Medicine, ³University of Maryland

Introduction: Restless sleep disorder (RSD) is an increasingly recognized sleep-related movement disorder causing significant daytime impairment. RSD has an estimated prevalence of 7.7% in pediatric patients seen in sleep medicine clinics. Similar to other sleep-related movement disorders, RSD has been associated with low iron stores. However, RSD differs from other sleep-related movement disorders as it is defined by the presence of large muscle movements. Given the relatively recent formal description of RSD, overall reported cases remain low. We present a case of RSD and low ferritin levels with response to oral iron supplementation.

Report of case(s): A 15-year-old female with no pertinent past medical history presented with concerns of insomnia and being a light sleeper. Her parents noted that she moved a lot while sleeping, often kicking both legs or tossing and turning. The Exact onset was unclear, though symptoms have been present for many years. Polysomnography was performed showing the presence of frequent large muscle movements. The large muscle movements were present in N2, N3, and R sleep, though the majority of events occurred in N2 sleep. The large muscle movement index

was 5.34/hour, meeting the proposed criteria for RSD. She also had periodic limb movements of sleep (PLMS) with an index of 10.8/hour; however, the PLMS were not associated with arousals and did not fragment her sleep. Iron studies were checked shortly before her initial presentation to the sleep clinic. Her ferritin level was low at 7 ng/mL. She was subsequently started on daily oral iron supplementation with Iron-Vitamin C 65-125mg tablets. After one month of oral iron supplementation, symptoms have started to improve, with parents noting less movement in sleep and sleep being more restful.

Conclusion: RSD is an important diagnostic consideration when evaluating pediatric patients with concerns of maintenance insomnia or frequent sleep-related movements. This report provides an example of RSD in the setting of low ferritin levels. Furthermore, iron repletion is essential in the management of RSD with comorbid low iron stores. Proper iron supplementation in these patients can alleviate symptoms and improve overall sleep quality.

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1372

FAMILIAL PROPRIOSPINAL MYOCLONUS: A CASE REPORT

Dakota Vaughan, Humberto Battistini
Medical College of Wisconsin

Introduction: Propriospinal myoclonus (PSM) is an uncommon sleep-related movement disorder characterized by paroxysmal jerking movements of the trunk and limbs, typically observed in the transition from wake to stage 1 NREM sleep. While often idiopathic, it has been associated with cervical and thoracic spinal pathology and in other cases felt to represent functional disorder. Here, we report the cases of a father and daughter who presented to our clinic with similar hypnagogic phenomena and were both treated for propriospinal myoclonus, highlighting the possibility for heritable risk factors.

Report of case(s): Patient 1 initially presented as a 56-year-old male with a longstanding history of jerking movements in his trunk and upper extremities, most prominently involving the abdominal wall. This had previously been treated as atypical RLS with partial response to dopamine agonist therapy. Notably, polysomnogram obtained at an outside facility prior to his presentation to our clinic was overall negative for periodic limb movements or observed myoclonic jerks. Over years of trialing several medications, his symptoms were best controlled with a combination of ropinirole and clonazepam. Patient 2, one of Patient 1's three children, presented years later as a 36 year-old female with similar jerking movements of the arms, chest and abdomen, typically occurring just prior to sleep onset. Further evaluation with in-lab polysomnogram was negative for observable limb movements or myoclonus on the night of the study. MRI with diffusion tensor imaging (DTI) of the patient's cervical and thoracic spine demonstrated disc herniation at C5-C6 without cervical or thoracic cord signal abnormality. Her symptoms have been well-controlled with 0.5mg clonazepam nightly as monotherapy.

Conclusion: Propriospinal Myoclonus is an uncommon movement disorder which can be difficult to diagnose and treat. To our knowledge, there have been no previously reported cases of familial presentations. We are limited by diagnostic uncertainty in absence of supportive testing (i.e. polymyography), but speculate

that there may exist heritable risk factors for the development of this condition.

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1373

DEEP BRAIN STIMULATION ARTIFACTS

Stephanie Chang, Dale Jun, Armand Ryden
UCLA

Introduction: Sleep concerns are common in patients with Parkinson's disease including insomnia, sleep fragmentation, daytime sleepiness, nightmares, periodic limb movements of sleep, and rapid eye movement (REM) sleep behavior disorder (1). Currently, Parkinson's medications can manage early motor symptoms, but an alternative treatment such as deep brain stimulation (DBS) is needed for more progressive motor symptoms (1). DBS is continuously activated throughout the night and has been shown to improve subjective sleep quality, increase total sleep time, and sleep efficiency in Parkinson's disease (1). However, the high frequency stimulation pulses from DBS in the brain can cause artifacts during polysomnography and even limit accurate sleep staging (2).

Report of case(s): A 66 year-old man with a history of tremor-dominant Parkinson's disease (diagnosed in 1999) complicated by REM sleep behavior disorder status post bilateral subthalamic nucleus deep brain stimulator (5/2018) for motor fluctuations and dyskinesias presented to sleep clinic with daytime fatigue, daytime sleepiness, and snoring. He was taking carbidopa/levodopa 25/100 mg four times per day. He was previously on melatonin, but this caused vivid dreams and ropinirole was associated with impulsive behavior. He was evaluated for obstructive sleep apnea with an in-lab polysomnography. Polysomnography did not demonstrate obstructive sleep apnea with an apnea-hypopnea index of 3.7 events an hour, but REM sleep without atonia and DBS artifacts were seen. His DBS was set to 200 Hz and can be seen as a narrow band of periodic artifacts in the electroencephalogram. Options to reduce DBS artifact include matched filtering and frequency-domain Hampel filtering as well as turning off the DBS, but this can cause increased tremor artifacts instead. Another option would be to switch the DBS to bipolar option to reduce interference (3). Patient denied recent nighttime movements or injuries and given a history of vivid dreams with melatonin, he was instructed on bed safety and monitoring of symptoms before a re-trial of melatonin.

Conclusion: It is important to understand polysomnography artifacts from patient-related electrical devices for an accurate sleep disorder diagnosis. Specifically with Parkinson's disease as these patients have an increased frequency of sleep related disorders.

Support (if any):

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1374

UNUSUAL OSCILLATIONS: A CASE OF SECONDARY PALATO-PHARYNGO-LARYNGEAL MYOCLONUS SEEN ON POLYSOMNOGRAPHY

Kiara Cerda MD¹, Kristina Key Cain², Alissa Higinbotham¹,
Vanessa Torrecillas¹, Elias Karroum³

¹University of Virginia, ²University of Virginia Medical Center,

³Department of Neurology, University of Virginia School of Medicine

Introduction: Palato-pharyngo-laryngeal myoclonus is a rare variant of palatal myoclonus characterized by involuntary, rhythmic contractions of the muscles of the soft palate, pharynx, and larynx. Symptoms include dysarthria, dysphonia, dysphagia, tinnitus, inappropriate vocal cord closure, or laryngospasm. Symptomatic palatal myoclonus cases are associated with brainstem lesions affecting the dentato-rubro-olivary tract (Guillain-Mollaret triangle). This results in hypertrophic olivary degeneration and disinhibition of the inferior olivary nucleus resulting in abnormal synchronized oscillations that propagate through the cerebellum to produce abnormal rhythmic motor output.

Report of case(s): A 64-year-old man with left cerebellar ischemic stroke complicated by pseudo-meningocele requiring ventriculoperitoneal shunt presented to sleep clinic with snoring and witnessed apneas. His neurologic deficits included left-sided ataxia, dysarthria, dysphonia, and dysphagia. Weeks to months after his stroke, he also developed an irregular breathing pattern and facial twitching. Respiratory symptoms were persistent throughout the day, limiting participation in rehabilitation, and notably worse at night. A split-night polysomnography (PSG) revealed severe central sleep apnea with an Apnea-Hypopnea Index (AHI) of 91.1/hr, with Cheyne Stokes respirations. During the titration portion of the study, a continuous, oscillating airflow signal of approximately 2 Hz frequency that was locked to rapid phasic bursts (lasting 150-200 ms) in the chin electromyogram (EMG) signal was visualized. Flexible laryngoscopy demonstrated visible bilateral (left-predominant) myoclonus of the soft palate, pharynx, and vocal folds confirming diagnosis of palato-pharyngo-laryngeal myoclonus. He underwent EMG guided botulinum toxin injection to left thyroarytenoid, left palatopharyngeal and palatal muscles with limited relief of symptoms. Pharmacologic therapies including levetiracetam, baclofen, and zonisamide provided minimal improvement. Regarding central sleep apnea, titration using CPAP, BIPAP, and BiPAP with respiratory rate were unsuccessful at controlling respiratory events. Subsequent Adaptive Servo-Ventilation titration demonstrated excellent control of respiratory events (residual AHI 2.5) and resulted in significant subjective benefits in sleep quality during follow up despite issues with mask leak and elevated residual AHI.

Conclusion: This case highlights the rare diagnosis of Symptomatic Palato-pharyngo-laryngeal myoclonus after stroke and the importance of monitoring for abnormal waveforms on PSG, as this could alert study interpreters to consider this condition.

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1375

POLYSOMNOGRAPHY FINDINGS IN FETAL FENTANYL SYNDROME

Jeremy Cho, Candace Muss, Seema Rani, Aaron Chidekel,
Abigail Strang
Nemours Children's Hospital

Introduction: In-utero opioid exposure and its implications on the developing brain continue to be an important area of evolving sleep research. There has been a substantial increase in the use of synthetic opioids, specifically fentanyl, since 2013. A novel syndrome in children with fetal fentanyl exposure was recently described, termed Fetal Fentanyl Syndrome (FFS), including features of small for gestational age, microcephaly, distinctive facial features, cleft palate, and other limb and genital abnormalities.

Specific facial features may increase the risk of obstructive sleep apnea in these children. Additionally, mice models demonstrate changes in sleep architecture and wake periods with decreased NREM and increased REM sleep after fentanyl exposure. This IRB-approved case series describes clinical characteristics, polysomnography results, and treatment of 4 children with FFS and sleep concerns at a large tertiary care center in Delaware, a state where the rate of neonatal abstinence syndrome is consistently above the national average.

Report of case(s): Four patients, (2-3 years old, 75% male) with FFS completed sleep medicine evaluation and polysomnogram. All patients reported baseline snoring; three reported apnea and gasping during sleep, and one was noted to have mouth-breathing. Common anatomical features were short or prominent nasal tips, low nasal bridges, and abnormal chin positioning with micrognathia or retrognathia. One patient was noted to have repaired cleft palate. 100% of PSG studies were positive for obstructive sleep apnea with AHI ranging 2.9 to 43 events/hr. One patient was recommended to start low flow supplemental oxygen support; the other patients were referred for otolaryngology evaluation. All four patients spent less than 20% total sleep time (TST) in REM sleep, ranging from 10.6% to 18.3%.

Conclusion: This case series highlights the importance of obtaining a thorough sleep history and maintaining high clinical suspicion of sleep apnea in patients with FFS, particularly patients with predisposing facial features. Future research focusing on the physiologic pathways affected by FFS and further investigation into PSG findings may improve screening and clinical care in this population.

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1376

AN UNPRECEDENTED 94% REDUCTION IN AHI WITH SEMAGLUTIDE IN A CPAP-INTOLERANT PATIENT

Teddy Ikhuorah¹, Barry Fields²

¹Morehouse School of Medicine, ²Emory School of Medicine

Introduction: Severe obstructive sleep apnea (OSA) with AHI >100/hr and coexisting sleep-related hypoventilation is rarely reversible without PAP therapy or bariatric surgery. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) improve weight and metabolic status, but near-complete remission of very severe OSA using pharmacologic therapy alone remains uncommon. This case describes dramatic improvement in OSA severity and hypercapnic physiology in a PAP-intolerant patient after substantial weight loss with semaglutide.

Report of case(s): A 65-year-old man with obesity, COPD, diabetes, hyperlipidemia, anxiety, and a 90 pack-year smoking history underwent baseline polysomnography (PSG) in 2021 for snoring and witnessed apneas. The study showed very severe OSA (AHI 137 events/hr), SpO₂ nadir 83%, and SpO₂ < 90% for 69% of total sleep time. Awake TcCO₂ was 52–56 mmHg, remaining >55 mmHg for >10 minutes during sleep, meeting criteria for sleep-related hypoventilation. His serum bicarbonate level was 31 mmol/L, raising concern for obesity-related hypoventilation. CPAP titration normalized his AHI, but the patient remained profoundly PAP-intolerant despite repeated trials and mask desensitization. In April 2023, semaglutide was initiated. Over 18 months, the patient lost 70 lbs (250 → 180 lbs) and reported improved dyspnea,

reduced sleepiness (Epworth sleepiness scale ESS 14 → 1), and resolution of insomnia (Insomnia severity index ISI 10 → 3). A repeat PSG in October 2024, performed entirely in non-supine position similar to baseline, demonstrated mild OSA (AHI 9.1 events/hr) with similar REM sleep time for comparison. Oxygenation normalized, and follow-up serum bicarbonate level decreased to 27 mmol/L, suggesting reduction of persistent hypercapnia. By late 2025, the patient remained asymptomatic without PAP or oral appliance therapy.

Conclusion: This case illustrates a 94% reduction in AHI and resolution of obesity-related hypoventilation following semaglutide-associated weight loss in a PAP-intolerant patient with very severe OSA. Consistent sleep positions and REM time between both PSGs, along with improvement in serum bicarbonate level, support a true physiologic reversal rather than positional or technical artifact. GLP-1 RAs may serve as a valuable adjunct or alternative therapy for select patients with severe obesity-related OSA who cannot tolerate device-based treatments.

Support (if any): n/a

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1377

AN UNEXPECTED SIGNAL: AUTONOMIC DYSFUNCTION UNMASKED BY HOME SLEEP APNEA TEST

Joy Wang, Caroline Skolnik

University of Illinois Chicago

Introduction: Clinically significant autonomic dysfunction can manifest in the context of sleep-disordered breathing. We present a case where an abnormal pulse rate response to obstructive events was identified on Home Sleep Apnea Test (HSAT), leading to an additional autonomic diagnosis beyond obstructive sleep apnea (OSA). This case highlights how HSAT can identify rare comorbidities, such as cardiovascular dysautonomia, and how treatment of OSA can improve sleep-disordered breathing and autonomic disease.

Report of case(s): A 29-year-old female with BMI of 28, asthma, and migraines presented with persistent fatigue following COVID-19 and EBV infections two years prior. She endorsed snoring, witnessed apneas, excessive daytime sleepiness, morning headaches, and gasping in her sleep with associated palpitations. A WatchPAT HSAT revealed mild OSA (AHI 3% of 5.9/hr) with prominent non-sustained episodes of tachycardia related to obstructive events. On average, heart rate increased 40 bpm (maximum 56 bpm) after respiratory events, correlating with the clinical complaint. Given the exaggerated cardiac response noted on HSAT, concern for dysautonomia led to referral for cardiac evaluation of arrhythmias. She underwent a tilt table test that demonstrated a 46 bpm (>30) increase in heart rate, diagnostic of postural orthostatic tachycardia syndrome (POTS). After starting PAP therapy, she experienced significant improvement in her fatigue and migraines, along with resolution of nocturnal palpitations.

Conclusion: In OSA, oxygen desaturations, abnormal central nervous system arousals, and sympathetic activation can lead to autonomic dysregulation. Studies show that CPAP therapy can restore abnormal baroreceptor function and reduce sympathetic overactivity. A typical pulse rate response to arousals or respiratory events may range from 6 to 15 bpm above baseline. This case highlights that an exaggerated heart rate variability detected on HSAT should prompt consideration of underlying dysautonomia.

As HSATs become more widely used, recognition of atypical pulse rate response can allow for early diagnosis and management of cardiovascular autonomic dysfunction triggered by sleep disordered breathing. This case highlights unique takeaways: first, that OSA can worsen dysautonomia and its treatment can relieve symptoms of both OSA and autonomic dysfunction; and second, that HSAT features beyond standard OSA screening can help direct clinicians in working up comorbidities worsened by OSA.

Support (if any):

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1378

PERSONAL ELECTRONICS AS A CAUSE OF ARTIFACT DURING SLEEP STUDY

Bikash Khanal, Vishal Patel

Corewell Health William Beaumont University Hospital

Introduction: Physiological and non-physiological artifacts during polysomnogram have been described as extra signals in a recording channel that can obscure or provide false data. Here we present a case of cell phone artifact seen during polysomnogram study.

Report of case(s): A 52-year-old female with history of obstructive sleep apnea (OSA) was referred to our sleep lab for polysomnogram with positive airway pressure (PAP) titration. PAP titration was started with pressure at 8 cm H₂O and titrated up to final pressure of 12 cm H₂O, which was effective in treating her OSA. During review of the polysomnogram, an artifact was noticed which was seen in all three frontal, central and occipital electroencephalography (EEG), bilateral electrooculography (EOG) and chin electromyography (EMG) channels. In addition, snore channel also had electronic interference. The pattern was composed of 20-22 Hz sinusoidal waves. The artifacts were seen despite use of notch filter. Review of the video recording showed that the artifact started when the patient woke up from sleep and started holding her phone. Then the artifact continued when her arm was laying on the phone. Artifact disappeared when technician moved the phone from under her arm to the bedside table.

Conclusion: Cell phones can cause potential interference during polysomnogram recordings. It has been recommended to keep electronic devices at least 3 feet away from laboratory equipment, preferably turned off and patient should not be touching the device during recording to minimize confounding results. Sleep technicians and physicians should be aware about the potential interference as these signals can mimic sleep spindles; can be misinterpreted in chin EMG as high muscle tone as well as lead to other misinterpretations. Review of audio/video recordings during interpretation can help provide clues to identify the artifacts. Our case demonstrated that the sleep technician was able to recognize the artifact that was associated with cell phone and the artifact disappeared after the phone was moved away from the patient.

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1379

OROFACIAL DYSKINESIA PRODUCING VIDEO-POLYSOMNOGRAPHIC ARTIFACT IN A PATIENT UNDERGOING EVALUATION FOR OBSTRUCTIVE SLEEP APNEA

Funmi Alabi¹, Adnan Abbasi²

¹University of Arizona, Tucson, ²Southern Arizona VA Health Care System

Introduction: Orofacial dyskinesia is an uncommon movement disorder characterized by involuntary, repetitive, stereotypical movement of the face, tongue, and jaw. These movements may mimic or confound sleep-related motor abnormalities and can create artifact during polysomnography (PSG). Recognition of this entity is important to avoid misinterpretation of sleep studies. We describe a case in which orofacial dyskinesia generated facial and oral movement artifact during video PSG performed for the evaluation of suspected obstructive sleep apnea (OSA).

Report of case(s): A 77-year-old male with past medical history significant for hypertension, hyperlipidemia, diabetes mellitus type 2, coronary artery disease, psoriasis, psoriatic arthritis, and remote history of sarcoidosis who underwent polysomnogram for evaluation of snoring, witnessed apneas and excessive daytime sleepiness. There was no recorded use of anti-psychotics, anti-depressants, anti-convulsant or anti-Parkinsonian agents. Most of his teeth were intact on oral examination. No significant snoring or sleep disordered breathing events were noted on attended overnight video PSG. Apnea-hypopnea index was 3.6 events per hour. Frequent periodic limb movement of sleep were observed (PLM index 43.1/hour; PLM arousal index 1.8/hour). Review of synchronized video revealed frequent, rhythmic, movements of the lips, perioral muscles, and mandible during wakefulness after arousal, which disappeared with drowsiness and sleep. These movements produced intermittent electromyographic (EMG) and 1 Hz EEG artifact. The involuntary movements were consistent with orofacial dyskinesia.

Conclusion: Orofacial dyskinesia can introduce artifact during video polysomnography. Possible differential for these movements include edentulous and non-edentulous orofacial dyskinesia, tardive dyskinesia, seizure disorder, bruxism and glossokinetic artifact. Awareness of this condition and careful review of synchronized video are essential for accurate diagnosis. Sleep clinicians should consider orofacial dyskinesia in edentulous and non-edentulous patients with unexplained facial or oral movements observed during polysomnography.

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1380

COCHLEAR IMPLANT-RELATED RHYTHMIC ARTIFACT ON SCALP EEG: EDUCATIONAL IMPLICATIONS FOR POLYSOMNOGRAPHY INTERPRETATION

Vinita Vaidya, Curtis Amankwah, Mouhannad Azzouz
West Virginia University

Introduction: Cochlear implants (CIs) generate electrical stimulation that can be detected by scalp electrodes, producing rhythmic waveforms that may resemble cerebral activity. While CI artifacts are known in EEG, their implications for polysomnography (PSG) are underrecognized. As more CI users undergo sleep testing, these device-dependent waveforms may be misinterpreted as alpha, theta, arousals, or epileptiform activity. We present a bilateral CI artifact identified during EEG monitoring and discuss its relevance for PSG interpretation.

Report of case(s): A 42-year-old woman with congenital bilateral sensorineural hearing loss and bilateral cochlear implants

underwent video-EEG monitoring for evaluation of brief behavioral arrest episodes. EEG demonstrated continuous rhythmic, sharply contoured activity over T7/T8, extending to P7/P8, with frequencies of 5–11 Hz and amplitudes of 50–150 μ V. The morphology was fixed, non-evolving, symmetric, and lacked physiologic field distribution. The pattern persisted across wakefulness and drowsiness without clinical correlation. Because of her bilateral CIs, artifact was suspected. Sequential deactivation of the CI processors led to immediate disappearance of the rhythmic activity, while reactivation reinstated unilateral or bilateral artifact depending on which device was powered. These reproducible on/off transitions confirmed a device-generated origin. Relevance to Polysomnography Although detected during EEG monitoring, the identical waveform would appear on PSG EEG channels, particularly temporal and mastoid leads. On PSG, CI artifact may mimic: • posterior alpha rhythm during wakefulness • rhythmic theta in N1/N2 • alpha intrusions or arousal-like bursts • temporal epileptiform discharges Misinterpretation may lead to incorrect sleep staging, inflated arousal indices, or unnecessary neurologic evaluation.

Conclusion: Cochlear implants can produce persistent alpha-theta rhythmic artifacts that resemble physiologic or epileptiform EEG patterns. Sleep physicians and technologists should recognize these device-dependent waveforms, which will appear on PSG, to avoid misinterpretation and unwarranted interventions.

Support (if any): McLaughlin M, Lu J, Dimitrijevic A. Cochlear implant artifact characterization on scalp EEG. *Clin Neurophysiol.* 2012;123(8):1505–1511. Gilley PM, Sharma A, Dorman MF. Cortical activity and cochlear implants: EEG considerations. *J Am Acad Audiol.* 2008;19(8):539–550. Castellanos NP, Díaz F. Artifact sources in EEG and strategies for their mitigation. *Int J Psychophysiol.* 2018;134:10–26. AASM Manual for the Scoring of Sleep and Associated Events, Version 2.6. American Academy of Sleep Medicine; 2020.

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1381

READING EYE MOVEMENTS ON POLYSOMNOGRAPHY: A MARKER OF WAKEFULNESS AFFECTING SLEEP STUDY INTERPRETATION

Qaiser Patel, Darian Aboubakare, Vishal Patel

Corewell Health William Beaumont University Hospital

Introduction: Polysomnography (PSG) relies on electrooculography (EOG) to stage sleep, particularly REM. Voluntary eye movements during wakefulness, such as slow horizontal conjugate movements resembling reading, may mimic sleep-related activity and lead to misinterpretation.

Report of case(s): A young adult female presented with insomnia and occasional hallucinations. History revealed chronic sleep restriction (2–6 hours/night) due to shift work and academic demands. PSG showed minimal snoring, no obstructive sleep apnea, reduced sleep efficiency, prolonged latency, and normal REM latency. EOG demonstrated slow, horizontal, conjugate movements during wakefulness, consistent with voluntary reading-like activity. MSLT revealed borderline latency and few SOREMPs, excluding narcolepsy. She was diagnosed with insufficient sleep syndrome and delayed sleep phase secondary to lifestyle factors. Management focused on sleep hygiene, schedule optimization, behavioral strategies, and no pharmacotherapy. Differentiating

“reading eye movements” from nystagmus, SSRI-related movements, scanning saccades, and REM bursts is essential. In this case, recognition of voluntary wake-specific movements prevented misclassification. Other eye movements to consider are: nystagmus (rhythmic, involuntary); “Prozac eyes” (SSRI-related in NREM); scanning (voluntary saccades awake); slow rolling (pendular in drowsiness) vs normal REM: reduced velocity/density (PSP vs. Parkinson’s); Ictal (saccades/drift in seizures); roving in coma; lucid signals (voluntary in REM); lateral spikes (artifacts); epileptic nystagmus and slowed vertical saccades (PSP).

Conclusion: Awareness of reading eye movements on PSG is critical for accurate sleep staging and avoiding diagnostic errors. Comprehensive interpretation, incorporating clinical history should guide management.

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1382

INVASIVE EEG MONITORING IDENTIFIES SLEEP SPINDLES IN INSULAR ELECTRODE CONTACTS IN A PATIENT WITH INTRACTABLE EPILEPSY

Joel Oster¹, Alana Fretes Burgos¹, Sheila Rajan¹, Maneesh Gaddam², Aarti Grover³, Greg Schumaker³, Rajesh Zacharias³, Wei He³, James Kryzanski³

¹Tufts Medical Center, ²Hazard ARH Regional Medical Center,

³Tufts University, Tufts Medical Center

Introduction: Invasive electroencephalogram (EEG) monitoring is a critical tool for identifying ictal onset zones in patients undergoing evaluation for epilepsy surgery. Beyond seizure localization, intracranial electrodes can reveal physiologic brainwave patterns not typically accessible through scalp EEG alone. In this case, depth electrodes placed in the insular region demonstrated clear sleep spindle activity occurring simultaneously with spindles recorded on scalp channels. To our knowledge, sleep spindle activity directly recorded from the insula has not previously been reported. This observation provides a novel window into the physiology of thalamocortical oscillations during sleep.

Report of case(s): A 36-year-old male with medically refractory epilepsy, experiencing multiple seizures monthly that started with an altered awareness and with occasional progression to generalized tonic-clonic convulsions, was admitted for invasive EEG monitoring to localize the ictal onset zone and guide further therapies. He had failed multiple antiepileptic medications and was considered at high risk of sudden unexplained death in epilepsy (SUDEP) since his seizures were not controlled. A 3T brain MRI was non-lesional except for a subtle finding of relatively increased FLAIR signal in the left insula compared with the right. He underwent invasive EEG monitoring with depth electrode implantation that included insular contacts. Ultimately, seizures were observed arising from the anterior polar and neocortical electrode contacts. Of note, during stage N2 sleep, characteristic spindle activity, waxing-waning bursts within the 11–16 Hz frequency range, was observed on the insular electrodes in addition to the usual expected localizations. The spindle activity recorded on the insula contacts temporally aligned with scalp-recorded spindles and showed similar durations and morphologies. The presence of spindle activity in the insula suggests potential involvement of this region in the propagation or modulation of thalamocortical sleep rhythms.

Conclusion: This case highlights a novel finding: sleep spindle activity recorded directly within the insula during invasive EEG

monitoring. While sleep spindles are traditionally associated with thalamocortical circuits involving frontal and parietal cortices, this observation raises important questions regarding the broader network dynamics underlying spindle generation. Further study is warranted to determine the prevalence, distribution, and mechanistic significance of insular spindle involvement in sleep physiology.

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1383

EVALUATING CONCORDANCE BETWEEN AI BED SENSORS, SLEEP DIARY, AND CPAP MEASURES IN OBSTRUCTIVE SLEEP APNEA

Rachel Steingart¹, Jeff Greenfield¹, Salma Patel²

¹University of Arizona College of Medicine, Tucson, ²The University of Arizona

Introduction: Consumer sleep technologies increasingly provide passive monitoring of sleep behavior, yet their clinical validity relative to subjective and medical-grade measures remains unclear. Obstructive sleep apnea (OSA) is characterized by recurrent upper-airway obstruction leading to apneic events, which are reliably quantified by continuous positive airway pressure (CPAP) devices. In contrast, AI-enabled smart beds detect movement-based awakenings—not apneas—and the relationship between these signals remains poorly understood. Because arousals and apneas represent different physiological events, any temporal association requires cautious interpretation. This case study evaluated concordance among an AI-enabled smart bed, a subjective sleep diary, and CPAP recordings across 22 nights in a patient with OSA, focusing on sleep duration, awakenings, and the temporal proximity between awakenings and apneic events.

Report of case(s): Simultaneous data were collected from (1) the AI bed (objective total sleep time and movement-based awakenings), (2) a subjective sleep diary (self-reported sleep duration and awakenings), and (3) CPAP device data (apnea-hypopnea index [AHI] and timing of apneic episodes). Correlations across systems were calculated. Temporal alignment analyses assessed whether AI-detected awakenings occurred within ± 5 , ± 10 , or ± 15 minutes of CPAP-recorded apneas. Because the devices measure non-equivalent phenomena, alignment metrics reflect temporal proximity rather than apnea detection. Sensitivity, positive predictive value (PPV), and F1 scores were computed to summarize correspondence. Temporal proximity between AI-detected awakenings and CPAP-recorded apneic events varied markedly by time window. Alignment was low at ± 5 minutes (sensitivity 17.8%, PPV 13.2%, $F1 = 0.15$) and modest at ± 10 minutes (sensitivity 24.2%, PPV 16.1%, $F1 = 0.19$). The greatest overlap occurred at ± 15 minutes, where approximately half of CPAP-recorded apneas occurred near an AI-detected awakening (sensitivity 52.2%), though precision remained low (PPV 26.5%; $F1 = 0.35$). These findings indicate partial temporal coupling but limited specificity, consistent with the distinct physiological bases of each signal.

Conclusion: The AI-enabled smart bed demonstrated minimal to moderate temporal proximity to CPAP-recorded apneic events, improving only with broader windows. While the AI bed captured general patterns of nighttime disruption, it did not reliably correspond to individual apneic episodes. Larger studies are needed to determine whether such consumer devices may complement clinical tools for monitoring sleep disruption in OSA.

Support (if any):

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1384

LEARNING FROM FALLS: REASSESSING AND DEVELOPING A SLEEP-LAB SPECIFIC FALLS PREVENTION PROTOCOL

John Das¹, Denise Kresevic¹, Muralidhar Pallaki², Pei-Jun Chen², Ambrose Chiang¹

¹Louis Stokes Cleveland VA Medical Center, ²Case Western Reserve University School of Medicine

Introduction: Falls within healthcare facilities represent one of the most prevalent safety incidents, particularly among geriatric patients. While falls in the sleep lab are uncommon, they can result in serious injuries, impose financial burdens, and raise concerns for healthcare staff and patient families. The widespread adoption of home sleep apnea testing has shifted the in-lab study population toward greater medical complexity. Yet, fall incidents in the sleep lab and targeted fall prevention policies have not been systematically explored. Two recent fall incidents with injuries in our sleep lab prompted a collaborative initiative between the Sleep Medicine Section and Veterans Affairs Geriatric Research, Education, and Clinical Center (GRECC). A Continuous Quality Improvement (CQI) Task Force was established to reassess the sleep lab environment and revise existing policies.

Report of case(s): The first incident involved an elderly male veteran undergoing an in-lab polysomnography for suspected REM behavior disorder. During the study, he declined to have the bedrails raised. While experiencing parasomnia during sleep, he fell from bed and struck the floor. The veteran was transferred to the Emergency Department, where imaging confirmed a hip fracture that required surgical intervention. The second incident involved another elderly male patient referred for sleep apnea evaluation, who took zolpidem to facilitate sleep. Unable to fall asleep immediately, he requested to watch television. An hour later, he requested assistance to use the restroom. While the sleep technician was disconnecting EEG leads, the patient abruptly stood and attempted to rush unassisted, falling backward and striking his head against a closet door. He was found transiently disoriented; imaging revealed a C2 vertebral fracture managed conservatively with a cervical collar.

Conclusion: Falls in the sleep lab remain underrecognized due to their infrequency and the rarity of serious injuries. Our CQI Task Force developed a “4E” framework focused on Environmental modification, Education enhancement, Emerging technologies integration, and Effective monitoring. This multidisciplinary approach integrates evidence-based fall prevention and pragmatic fall prevention strategies. Targeted sleep lab-specific fall prevention policies and the inclusion of these protocols in AASM sleep lab accreditation standards will likely enhance patient safety within sleep medicine.

Support (if any):

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1385

FROM RURAL TITRATION TO INTUBATION: A MORBIDITY & MORTALITY STYLE CASE REVIEW

Patrick Holman¹, Stephanie Chang¹, Michelle Zeidler¹, Armand Ryden², Kevin Eng¹

¹UCLA Health, West Los Angeles VA, ²UCLA

Introduction: As expansion of services for rural veterans is prioritized, new clinical challenges emerge. Patients with sleep related hypoventilation disorders require complex in-lab non-invasive ventilation (NIV) titration studies. These often occur with limited in-person clinical evaluations prior to the study. We present a case of a complex rural patient in whom patient factors combined with inadequate NIV titration precipitated clinical decompensation.

Report of case(s): A rural 67-year-old man with BMI of 46, severe obstructive sleep apnea (OSA), chronic hypoxia on 2 L/min oxygen, and chronic pain treated with opioids was referred to our sleep center. A split polysomnogram (PSG) in the community a baseline apnea-hypopnea index (AHI) of 69/hr and hypoxia inadequately controlled during titration up to bilevel positive airway pressure (BPAP) settings of 28/24 cmH₂O. He was brought to our sleep lab for NIV titration. Patient took home dose of opioids prior to the PSG and a second dose midway through the study, with a snack. Transient central apneas were observed after sleep onset. He was initially started on BPAP 14/8 cmH₂O without oxygen and was uptitrated to 26/18 cmH₂O with 6 L/min of oxygen. Obstructive events resolved but he continued to hypoventilate with oxygen saturation remaining < 88% for 78% of the total sleep time. At study completion, EEG was consistent with encephalopathy, patient was difficult to arouse, prompting a rapid response. He was found to be obtunded with acute on chronic hypercarbic and hypoxic respiratory failure requiring emergent intubation. Chest imaging demonstrated a new pneumonia. He was extubated the next day to average-volume assured pressure support with improvement in his hypercapnia.

Conclusion: This case highlights the vulnerability of high-risk rural patients with complex cardiopulmonary diseases. Incomplete characterization of underlying physiology, combined with a challenging titration study contributed to a preventable adverse outcome prompting multidisciplinary case review. New pathways for caring for rural patients are essential, to allow for up-front diagnostics and comprehensive titration plans. Sleep lab protocols should ensure recommended metrics such as tidal volume and CO₂ monitoring are implemented during NIV titrations, and the use of home meds and eating during studies should be scrutinized to prevent patient harm.

Support (if any):

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1386

TIMELY EVALUATION AND MANAGEMENT OF SLEEP DISORDERS IN A PATIENT WITH TUBEROUS SCLEROSIS

Mercy Azubuko-Udah¹, Naomi Ghildiyal², James Hall¹, Alok Pant²,

Minh Tam Ho², Cesar Liendo², Oleg Chernyshev³, Shiela Asghar²

¹Louisiana State University Shreveport, ²Ochsner LSU Health Medical Center, ³LSU Health Sciences Center at Shreveport

Introduction: Tuberous sclerosis is a genetic disorder characterized by multi-system involvement, including pulmonary and neurological involvement. OSA is a significant co-morbidity often underdiagnosed, and its timely evaluation and management can lead to improved outcomes.

Report of case(s): The patient is a 45-year-old with a history of HTN, seizure disorder, and recently diagnosed with OSA. While he was in elementary school, the patient was diagnosed with tuberous sclerosis on testing, with a mother and brother who also suffered from the same condition. At the time, he suffered

from seizures with the last seizure occurring in middle school and is currently being followed by Neurology for seizure prevention and migraine management associated with the condition. An MRI of the brain with contrast was performed in 2022 showing stable calcified subependymal nodules suggesting likely cortical tubers consistent with the disease process. He is not currently being followed by Pulmonology for any related lung conditions. In 2023, he was seen in our Sleep clinic with complaints of frequent night awakenings, snoring, witness apnea events, and daytime sleepiness. A polysomnogram was performed and confirmed the presence of moderate OSA with an AHI of 20.4 events per hour. He was initiated on Continuous Positive Airway pressure (CPAP) therapy at that time and has shown significant improvement in his sleep quality on therapy despite suboptimal usage; as well as an improvement in his blood pressure and overall quality of life.

Conclusion: Sleep disorders are highly prevalent in TSC, affecting 59.3% of the pediatric population and 46% of adults. Patient with Tuberous sclerosis and OSA demonstrated improvement in his overall health with PAP therapy without significant barriers or complications given his underlying genetic condition. Early detection and treatment of sleep disorders may ameliorate behavior and attention difficulties; and active surveillance is recommended to reduce disease burden and improve outcomes.

Support (if any):

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1387

MULTIMODAL TREATMENT INCLUDING ACUPUNCTURE FOR POST-TRAUMATIC BRAIN INJURY SLEEP DYSFUNCTION: A CASE REPORT

Will Potratz, Stephen Huang, Amaan Viridi, Arth Thaker,

John Abdallah, Vance Johnson

California University of Science and Medicine

Introduction: Over 18% of American adults report prior traumatic brain injury (TBI), with the CDC reporting over 586 TBI-related hospitalizations per day. Research suggests that more than half of these patients experience sleep dysfunction, which jeopardizes their long term outcomes by limiting post-acute recovery. Treatment modalities such as CBT-I and melatonin are routinely employed for post-TBI sleep dysfunction, but compliance, patient preferences, and variation in the underlying cause of sleep dysfunction create a prominent risk for treatment failure. To alleviate this risk, we propose the use of a multimodal treatment plan that incorporates various well-tolerated treatment modalities along with acupuncture. We present a patient with post-TBI sleep dysfunction, successfully treated with a multimodal insomnia treatment plan.

Report of case(s): A 33-year-old female one month post-rehabilitation for moderate TBI presented to an outpatient PM&R clinic with insomnia, difficulty initiating and maintaining sleep, nocturnal awakenings, and daytime fatigue. Treatment was initiated with an individualized multimodal plan including cognitive behavior therapy for insomnia (CBT-I), acupuncture, melatonin, light therapy, and structured sleep hygiene. CBT-I included in-person and online sessions. Acupuncture was used for sleep and mood support, while morning bright light, blue-wavelength light therapy, and melatonin (2-10 mg nightly for 4 weeks) were used to address circadian rhythm disruption. Sleep hygiene education included sleep-wake schedules, minimizing naps, and optimizing sleep environment. Following these interventions, the patient

showed improvements in sleep quality, insomnia severity, daytime alertness, and rehabilitation engagement. Her spouse reported improvements in her activities of daily living and sleep continuity. **Conclusion:** After inpatient care ends, patients return home and frequently develop sleep dysfunction in the less-supervised outpatient setting, jeopardizing their recovery. The first months following TBI represent a critical window to restore sleep function, with research indicating that this opportunity closes soon after discharge. During a period of recovery when sleep quality must urgently be restored, treatment failure means inadequate post-acute recovery and permanent detriment to the patient. This case demonstrates the clinical effectiveness of a multimodal approach that incorporates acupuncture to produce observable clinical benefits in post-acute TBI care and its potential to become a standard option for sleep dysfunction in this population.

Support (if any):

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1388

ULTRA-LOW DOSE MIRTAZAPINE (3.75 MG) FOR INSOMNIA: EFFICACY AND RESIDUAL SEDATION

John Das¹, Kamal Gandotra¹, Kingman Strohl²

¹Louis Stokes Cleveland VA Medical Center, ²University Hospitals/Case Western Reserve University

Introduction: Mirtazapine has complex pharmacologic properties, with lower doses exerting sedative effects through antihistaminergic activity and higher doses showing activating, noradrenergic effects. Low-dose mirtazapine (7.5–15 mg) is often prescribed off-label for insomnia, though it frequently causes troublesome daytime drowsiness. We speculated that an ultra-low dose (3.75 mg) might improve insomnia while minimizing next-day sedation. We present two cases demonstrating that even ultra-low doses can lead to significant residual sedation, suggesting that this adverse effect may not be dose-dependent.

Report of case(s): A 60-year-old veteran with obstructive sleep apnea on AutoCPAP, periodic limb movement disorder (PLMD), and insomnia secondary to PLMD had an Insomnia Severity Index (ISI) of 20 and Epworth Sleepiness Scale (ESS) of 11. PLMD was partially stabilized on gabapentin. Trazodone 50 mg nightly reduced PLMD frequency but failed to improve insomnia. Trazodone was replaced with mirtazapine 3.75 mg nightly. After one month, ISI improved to 7, but ESS increased to 24, consistent with significant next-day sleepiness. Upon discontinuation of ultra-low dose mirtazapine, ESS returned to baseline. A consult for CBT-I was placed. An 81-year-old veteran with depression, insomnia, and chronic pain, controlled on duloxetine 60 mg, had an initial ISI of 24 and ESS of 7. Mirtazapine 3.75 mg nightly was started for nocturnal sleep fragmentation. After two months, ISI improved to 12, but ESS rose to 21, again indicating prominent residual sedation. Mirtazapine 3.75 mg nightly was substituted with Doxepin 10 mg nightly, which provided similar efficacy with tolerability.

Conclusion: Ultra-low dose mirtazapine (3.75 mg) may improve insomnia symptoms and ISI scores, but next-day residual sedation remains a clinically significant concern. Prior studies have shown daytime drowsiness in up to 54% of patients taking 7.5–15 mg, often described as a “hangover” feeling. These cases demonstrate that sedation can occur even at ultra-low doses, potentially limiting its clinical utility for insomnia management. Clinicians

should routinely screen for next-day sedation in patients prescribed low-dose mirtazapine for sleep, and future randomized controlled trials are needed to evaluate the efficacy and tolerability of ultra-low dosing.

Support (if any):

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1389

PROGRESSIVE NEUROCOGNITIVE DECLINE AND INSOMNIA: A CASE OF FATAL FAMILIAL INSOMNIA IN A PATIENT WITH CORTICOBASAL SYNDROME

Tamara Sleem, Ruoyan Zhu, Sara Geisinger, Marwan Sabbagh, Michael Robers, Joyce Lee-Iannotti
Barrow Neurological Institute

Introduction: Fatal familial insomnia (FFI) is a rare, autosomal dominant prion disease characterized by progressive, treatment-refractory insomnia, cognitive decline, motor dysfunction, and autonomic instability. Diagnosis is challenging due to heterogeneous presentations and overlap with other neurodegenerative disorders.

Report of case(s): A 45-year-old male developed progressive cognitive impairment, memory loss, gait imbalance, right hemiparesis, apraxia, visual changes, behavioral disturbances, urinary frequency, and severe insomnia over the course of three years. By year two, insomnia became profound and refractory to quetiapine, ramelteon, zolpidem, clonazepam, suvorexant, with total sleep time < 5 hours nightly. Daytime napping was absent. Without sedative medications, the patient was unable to sleep. He exhibited rapid functional decline with frequent falls and inability to perform ADLs, requiring total care. No family history of sleep disorders was reported. Extensive evaluation revealed asymmetric cortical atrophy on MRI, hypometabolism in the left frontal and parietal lobes and right precuneus on FDG-PET, and reduced dopamine transporter activity on (DaT) scan. EEG showed moderate encephalopathy with bitemporal dysfunction on EEG, and CSF studies notable for negative RT-QuIC, elevated 14-3-3 gamma, and normal t-Tau. Skin biopsy was negative for alpha-synucleinopathy. Neuropsychological testing confirmed major neurocognitive disorder. Workup for autoimmune, metabolic, paraneoplastic, and infectious etiologies was unremarkable. An empiric trial of steroids and IVIG did not provide any objective benefit. The clinical course was initially attributed to CBD based on asymmetric cortical atrophy, parkinsonism, and apraxia; however, the rapid emergence of profound insomnia, autonomic dysfunction, and progressive decline – combined with negative evaluation for alternative etiologies – raised strong suspicion for FFI, even without a family history.

Conclusion: This case highlights the diagnostic challenge of distinguishing FFI from neurodegenerative disorders, as both can present with overlapping motor, cognitive, and neuropsychiatric features, while standard imaging and laboratory studies may be inconclusive. Recognition of the distinctive sleep-autonomic signature of FFI is critical, and genetic testing for PRNP mutations should be pursued when clinical suspicion persists, even in the absence of a family history.

Support (if any):

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1390

COMORBID INSOMNIA AND OBSTRUCTIVE SLEEP APNEA IN HUNTINGTON'S DISEASE: A CASE REPORTFrancisco Vizcaino¹, Reagan Atha², Julio Fernandez-Mendoza³¹Penn State Health St. Joseph's Medical Center, ²Penn State Health Sleep Research & Treatment Center, ³Penn State University, Hershey

Introduction: Sleep disturbances are common in Huntington's disease (HD), including insomnia, circadian delay, and obstructive sleep apnea (OSA). Comorbid insomnia and sleep apnea (COMISA) is associated with greater symptom burden, reduced positive airway pressure (PAP) adherence, and impaired daytime function. Treatment is particularly challenging in neurodegenerative diseases, where fatigue, chorea and cognitive hyperarousal may hinder behavioral interventions. We describe a patient with HD and moderate OSA who achieved rapid insomnia remission using measurement-guided cognitive behavioral therapy for insomnia (CBT-I) with adaptations for fatigue.

Report of case(s): A 37-year-old woman with genetically confirmed HD presented with long-standing insomnia, excessive daytime sleepiness, and loud snoring. Baseline assessments included ISI 23, ESS 11, evening chronotype, pronounced sleep inertia, cognitive hyperarousal, and sleep extension (time-in-bed 11.5 h). Home sleep testing showed moderate-severe OSA (AHI 36.2). PAP had been initiated previously but was poorly tolerated. Measurement-based CBT-I was started with an initial 8.5-hour sleep window (01:00–09:30), weekly titration contingent on sleep efficiency $\geq 85\%$, stimulus control, constructive worry, and relaxation training. Because of HD-related excessive sleepiness and fatigue, we incorporated scheduled daytime power naps (≤ 30 min, ending by 16:00) while enforcing strict behavioral contingencies to maintain sleep drive. Rapid improvement was noted. Within four weeks, ISI decreased from 23 to 12; by week seven, ISI reached 4. Sleep-diary metrics normalized (SOL 60→10 min; WASO 60→5 min; awakenings 3→1; SE 69.6%→93%). ESS improved from 11 to 4, and functional outcomes improved (FOSQ 16→22). Sleep quality rose from 1 (poor) to 3.5 (good). Short, planned naps prevented fatigue without disrupting nocturnal sleep. No adverse effects occurred, and mood screens remained negative.

Conclusion: In a patient with HD and COMISA, tailored CBT-I produced rapid and durable insomnia remission despite ongoing OSA and neurologic comorbidity. Strict titration of sleep opportunity, structured daytime napping, and targeted reduction of cognitive hyperarousal were central to treatment success. Behavioral therapy should be considered early in COMISA involving neurodegenerative disease, with pragmatic adaptations to support adherence and functional stability.

Support (if any): None

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1391

SLEEP DISTURBANCE IN HUNTINGTON'S DISEASE: A CASE REPORTGabriel Saliba¹, Arminder Johal²¹Ascension St. Vincent, ²Indiana University Health

Introduction: Huntington's disease (HD) is an autosomal dominant genetic neurodegenerative disorder which often overlaps

with various sleep disorders. Research suggests that underlying sleep dysfunction in HD impairs quality of life, can exacerbate symptoms, and may accelerate neurodegeneration. There is limited evidence on managing sleep disorders in patients with HD. We present a challenging case of a patient with HD, chronic insomnia, obstructive sleep apnea, and restless leg syndrome.

Report of case(s): A 42-year-old male with HD presented to sleep medicine clinic for evaluation of sleep disturbances. His main concern was chorea during sleep, RLS, and sleep maintenance insomnia. He did snore, especially in supine position. He had a bedtime of 10:30 pm, sleep latency of 10 minutes, waketime 7-8:00 am, 12-night awakenings, total estimated sleep time of 5-6 hours. Medications at bedtime included gabapentin 900mg, quetiapine 50mg, clonazepam 1mg, and melatonin 5mg. In the past, insomnia did not improve with trazodone or doxepin. A sleep study was recommended to evaluate for sleep apnea. Gabapentin dose was increased to 300mg 6 hours prior to bedtime, 900mg 1 hour prior to bedtime. A home sleep apnea test (HSAT) showed an AASM (3% desaturation) apnea hypopnea index (AHI) of 30.0/hr, O₂ nadir 86%, supine AHI 78.3/hr. The patient started Auto-PAP and had follow-up 3 weeks later. Download showed total usage days of 94%, average usage of 4.75 hours, APAP 6-16cmH₂O, residual AHI 8/hr, central apnea index of 6.8/hr, and minimal mask leak. His RLS did improve with adjusting medication timing, but he continued to experience chorea during sleep, which woke him up multiple times per hour. Plan included iron studies, serum ferritin, referral to psychology for cognitive behavioral therapy-insomnia, and follow-up with neurology. PAP titration was recommended to evaluate for treatment emergent central sleep apnea.

Conclusion: This case demonstrates the complexity of managing an overlap of a progressive neurodegenerative condition, OSA, RLS, and chronic insomnia. A multidisciplinary and multi-system approach is important to address sleep and neuropsychological disorders in HD. Further research is needed to understand optimal management of sleep disorders, especially chorea during sleep in HD.

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1392

MELATONIN-NUTRITION SYNERGY RESOLVING CHRONIC SLEEP MAINTENANCE INSOMNIA IN A CHILD WITH TURNER SYNDROME

Maithili Udupa

University Hospitals Cleveland Medical Center

Introduction: Children with Turner syndrome are at elevated risk for sleep-disordered breathing and chronic insomnia due to craniofacial structure, developmental delay, and complex medical comorbidities. However, limited evidence exists on how basic physiological supports may modify sleep patterns in this population. We present a child with Turner syndrome whose years-long pattern of severe sleep fragmentation improved rapidly and unexpectedly following combined melatonin therapy and nutritional supplementation.

Report of case(s): A 5-year-old girl with Turner syndrome, aortic coarctation, valvular heart disease, failure to thrive, and global developmental delay was referred for chronic sleep maintenance insomnia beginning in infancy. Her baseline sleep pattern involved frequent nighttime awakenings, prolonged nocturnal alertness, and an inverted schedule characterized by daytime sleep.

Behavioral sleep routines had been attempted without improvement. Despite fragmented sleep, she displayed daytime hyperactivity without excessive sleepiness. Examination revealed craniofacial features typical of Turner syndrome—retrognathia, midface hypoplasia, high-arched palate, and webbed neck—contributing to elevated risk for sleep-disordered breathing. Snoring was mild and intermittent, with no witnessed apneas, parasomnias, or restless sleep behaviors. At the time of sleep evaluation, caregivers reported a striking and unexpected improvement. Two interventions initiated several weeks earlier—melatonin 2 mg nightly and a calorie-dense nutritional supplement—were associated with rapid sleep consolidation. Her mother described a shift from hours of nighttime wakefulness to effortless sleep initiation/maintenance. The child now fell asleep within 5 - 10 minutes, slept from 10 PM to 8 AM without awakenings, and took only a brief afternoon nap. Symptoms were reflected by a Pediatric Epworth Sleepiness Scale score of 7 and Insomnia Severity Index of 4. Because sleep had normalized, snoring was minimal, and daytime functioning was appropriate, polysomnography was deferred. Given Turner-associated craniofacial airway risk ongoing monitoring was advised with sleep testing recommended if snoring worsened, sleep fragmentation recurred, or cardiopulmonary symptoms emerged.

Conclusion: This case demonstrates dramatic resolution of severe, chronic sleep maintenance insomnia in a child with Turner syndrome following combined melatonin and nutritional supplementation. The synergistic impact of physiologic sleep support and improved nutrition may be under recognized in this population. The case also emphasizes individualized decision-making regarding polysomnography guided by evolving clinical presentation rather than diagnosis alone.

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1393

WHEN THE TONGUE HIT SNOOZE: A POST-OPERATIVE SURPRISE!

Rafia Zubair, Ram Verma, Baraa Aljebawi, Praneet Dara
Parkview Health, Indiana

Introduction: Hypoglossal nerve stimulation (HNS) is an emerging alternative treatment option for moderate-to-severe obstructive sleep apnea (OSA) in patients who are unable to use or benefit from positive airway pressure therapy. Hypoglossal nerve neura-praxia is a mild nerve injury characterized by a transient and reversible nerve conduction block, without axonal disruption, resulting in temporary tongue deviation, weakness, dysphagia, and dysarthria. We present two patients with transient hypoglossal dysfunction after upper-airway stimulator placement.

Report of case(s): Patient 1: A 49 y.o. female presented with daytime somnolence, fatigue, and snoring, diagnosed with severe OSA on home sleep study. Inspire device was implanted due to intolerance to CPAP secondary to facial rash and suffocation. Activation of inspire therapy was delayed due to post-surgical neura-praxia despite of going up to 3.0 volts on setting A, B or C. Her device was successfully activated 3 months later, after she noticed gradual improvement. The patient was put on setting A with functional voltage of 1.8 volts which was then changed to setting B with incoming voltage of 1.5 volt because of discomfort. Patient 2: A 79 y.o. overweight female presented with fatigue and snoring, was found to have nocturnal hypoxemia attributable to

moderate OSA diagnosed on home sleep study, intolerant to CPAP. An attempt was made to activate her device 2 months after her Inspire implant placement but she developed neura-praxia and did not get tongue movement at that time. A successful re-attempt was carried out 5 months later, after she noticed improvement in her tongue movement and function. The patient responded well to setting C with a voltage range of 2.2-3.2 volts.

Conclusion: Up to now, attempts have been made to activate the nerve stimulator just a couple of weeks after its placement, even though minor hypoglossal nerve injury is not an uncommon side effect. For transient or neura-praxic injuries, about 50% of patients recover within 8 weeks and 80% within 16 weeks. Our experience highlights the importance of delaying the activation of the Hypoglossal Nerve Stimulator by 12 to 16 weeks, as it can lead to more successful outcomes and less patient discomfort as compared to premature activation.

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1394

SEVERE INSOMNIA DUE TO A SLEDGEHAMMER: A CASE REPORT ON EXPLODING HEAD SYNDROME

Darian Aboubakare, Qaiser Patel, Nader Mina
Corewell Health William Beaumont University Hospital

Introduction: Exploding head syndrome (EHS) is a non-life-threatening sleep disorder that can cause tremendous suffering for patients. The International Classification of Sleep Disorders (ICSD-3) classifies EHS as Other Parasomnias characterized by sudden loud noise or sense of explosion in the head at sleep onset. EHS is typically described as sounds like thunder, blasts, gunshots, or electrical sounds. We report a case of a 77 year-old female suffering from severe insomnia secondary to a sledgehammer pounding her head.

Report of case(s): A 77-year-old female with a past medical history of headache, anxiety, chronic insomnia, and obesity, presented for severe insomnia for 15 years. Patient describes a painless sledgehammer banging in her brain every night at sleep onset. This sensation shocks her awake causing significant anxiety. Patient intentionally prevented sleep until exhaustion so the sledgehammer could no longer wake her. Once asleep, patient reported averaging 7 hours of continuous sleep. She reported mild snoring. She denied any headache, pain, numbness, or abnormal movements. Patient had multiple brain imaging in the last 15 years, which were negative for stroke or any acute process. She follows neurology for these painless head explosions. Patient was prescribed various headache medications over the years and only gabapentin improved the severity. Patient was diagnosed with EHS and reassurance was provided. Patient had polysomnography (PSG) to evaluate for obstructive sleep apnea and parasomnias. Patient doubted that she could fall asleep before her usual sleep onset time of 4am. Her PSG was diagnostic for mild obstructive sleep apnea, AHI 3% of 11.49/hour. Sleep latency was 74 minutes (sleep onset time was 23:10pm), significantly improved compared to her usual sleep latency of over 360 minutes. Patient reported better sleep compared to at home and did not experience EHS symptoms during the PSG.

Conclusion: Our case report demonstrates when delayed diagnosis of EHS can have significant disruption to a patient's life. Despite multiple evaluations, the diagnosis of this parasomnia

was missed. After counseling and reassurance of the prognosis of EHS, patient was able to sleep better during her PSG than she had in the last 15 years.

Support (if any):

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1395

WAKE-UP CALL: NARCOLEPSY SYMPTOM IMPROVEMENT AFTER BARIATRIC SURGERY IN AN ADOLESCENT

Candace Miyaki¹, Ameer Revana²

¹Baylor College of Medicine, ²Baylor College of Medicine and Texas Children's

Introduction: Narcolepsy is closely associated with metabolic dysfunction, particularly obesity. Standard therapy focuses on improving sleep efficiency and reducing excessive daytime sleepiness (EDS). Bariatric surgery is a well-established intervention for obesity, but its effect on narcolepsy has not been reported. We present an adolescent with narcolepsy who demonstrated notable improvement following bariatric surgery.

Report of case(s): A 9-year-old female presented with EDS. Apart from obesity, her history was unremarkable. Diagnostic testing—including actigraphy, polysomnography (PSG), multiple sleep latency testing (MSLT), and presence of cataplexy—confirmed narcolepsy type 1. Her EDS was refractory to multiple stimulants, including methylphenidate, amphetamine/dextroamphetamine, modafinil, armodafinil, and lisdexamfetamine. Within a year she developed mild obstructive sleep apnea (OSA) requiring PAP therapy, but symptoms persisted. At age 12, sodium oxybate led to substantial improvement and was later transitioned to mixed-salt oxybate to limit sodium intake. Despite this, binge eating and progressive weight gain continued, with BMI reaching 48. At age 14, she underwent bariatric surgery and lost over 40 pounds. Repeat PSG revealed only primary snoring, allowing PAP discontinuation while oxybate was continued. By age 16, oxybate was tapered due to mood concerns and pitolisant was initiated. Around this time, she regained more than 40 pounds. After 6 months, she discontinued pitolisant, reporting consolidated sleep and improved daytime alertness. Remarkably, she no longer required daily lisdexamfetamine and used only occasional methylphenidate as rescue therapy, despite regaining her prior weight.

Conclusion: Narcolepsy treatment is often complex, requiring multiple pharmacologic and supportive strategies. In this case, bariatric surgery was followed by weight loss, resolution of OSA, and meaningful reduction in narcolepsy symptoms. Even after weight regain, the patient maintained improved sleep quality and reduced EDS, raising the possibility that bariatric surgery exerts effects beyond weight reduction—potentially through altered sleep physiology, metabolic signaling, or other mechanisms. To our knowledge, no prior reports describe bariatric surgery as a modifier of narcolepsy outcomes. Further study is needed to clarify whether weight reduction or metabolic changes following surgery can contribute to improved disease control in narcolepsy.

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1396

BIOT'S BREATHING REVEALED ON POLYSOMNOGRAPHY IN SECONDARY PROGRESSIVE MULTIPLE SCLEROSIS WITHOUT RADIOGRAPHIC BRAINSTEM LESIONS

Kushaghar Singla¹, Rupan Deep Kaur², Maithily Patel², Vinita Vaidya³, Sreekarthik Athiyaman⁴, Kassandra Olgers³, Sunil Sharma⁵

¹Hospital of the University of Pennsylvania, ²WVU Wheeling Hospital, ³WVU Medicine Ruby Memorial Hospital, ⁴New York Medical College, St. Mary's and St. Clare's Health, ⁵West Virginia University

Introduction: Biot's breathing, characterized by clusters of irregular respirations interrupted by abrupt central apneas, is classically associated with medullary injury. Although multiple sclerosis (MS) can produce central sleep apnea (CSA) through brainstem demyelination, Biot's respiration is rarely documented on polysomnography (PSG), particularly in the absence of radiologic brainstem abnormalities. We report a case of secondary progressive MS (SPMS) in which PSG revealed Biot's breathing despite stable imaging and discuss the differentiation from baclofen-induced respiratory depression.

Report of case(s): A 61-year-old woman with SPMS (diagnosed 1998) presented with excessive daytime sleepiness and sleep attacks. Her comorbidities included migraine, coagulopathy, and prior obstructive sleep apnea (intolerant to CPAP due to cranial pain). She was neurologically stable on ocrelizumab. Serial MRIs from 2019–2024 demonstrated extensive chronic supratentorial demyelination without active lesions or brainstem involvement. In-lab PSG (2025) showed an AHI of 19.6 events/hour, almost entirely central (central AHI 17.5). The respiratory pattern consisted of irregular clusters of respirations with sudden, short central apneas, consistent with Biot's breathing. Snoring and obstructive events were minimal. Oxygen saturation nadir was 77%, with 80 minutes < 88%. No arrhythmias were identified. The patient was taking baclofen 20 mg four times daily and had documented autonomic dysfunction (acral discoloration, dysphagia), raising the question of baclofen-related hypoventilation. However, multiple PSG features supported medullary respiratory generator instability rather than drug effect: (1) abrupt central apneas with preserved tidal effort between apneas; (2) normal chest and abdominal movement without the shallow, uniform hypoventilation typical of baclofen; (3) apnea-linked, discrete desaturations; and (4) preserved EEG architecture without sedation patterns. These findings favored true Biot's respiration related to MS. The patient declined PAP titration due to prior intolerance; no alternative therapy has been initiated.

Conclusion: This case highlights the diagnostic utility of PSG in detecting Biot's breathing as a manifestation of subclinical medullary dysfunction in SPMS, even when MRI is unrevealing. Distinguishing Biot's respiration from medication-induced hypoventilation is essential, and preserved tidal effort with abrupt apneas can aid differentiation. PSG may reveal clinically significant respiratory instability in chronic MS, underscoring the need for tailored management approaches for CSA in this population.

Support (if any):

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1397

MULTIDISCIPLINARY MANAGEMENT OF RARE PEDIATRIC CONDITIONS: A CASE STUDY ON MEDICATION-INDUCED AUGMENTATION OF RESTLESS LEG SYMPTOMS

Rachel Roark, Mohini Gunnett

Division of Pediatric Pulmonary & Sleep Medicine, University of Alabama at Birmingham

Introduction: Dopamine agonists are infrequently used for restless leg syndrome (RLS) in pediatrics. This case describes a rare example of restless leg augmentation in pediatrics.

Report of case(s): A 14-year-old female with Kufor-Rakeb syndrome presented with snoring, difficulty initiating and maintaining sleep, and hypersomnia. One year prior, she began carbidopa/levodopa for management of her muscle rigidity, bradykinesia, and tremors. While her parkinsonism symptoms improved, she developed significant restlessness at night with frequent awakenings.

Polysomnography indicated mild-to-moderate obstructive sleep apnea and an elevated periodic limb movement index of 16.4 events/hr. Sleep apnea resolved after adenotonsillectomy. However, restlessness and limb movement severity persisted. Over time, restlessness began occurring earlier in the evening and spreading to her upper body. These changes were noted to correlate with dose increases of carbidopa/levodopa therapy raising concerns for dopaminergic augmentation.

Carbidopa/levodopa could not be discontinued given limited alternate therapies approved for pediatric patients with this condition. To avoid further augmentation, sleep and neurology providers worked with the patient to administer her nighttime total dose as two separate doses, with one given 2 hours prior to bedtime and the other at bedtime. While not standard administration, the patient's restlessness, nighttime awakenings, and parkinsonism symptoms drastically improved. Given augmentation concerns, sleep and neurology providers made the decision to gradually wean the patient off carbidopa/levodopa therapy with interval use of a low-dose ropinirole patch. After this transition, the sleep provider will consider supplementing an alpha-2-delta ligand to assist with any sub-optimal control of restless legs. Lastly, her ferritin was notably low, prompting iron supplementation. After ferritin levels were optimized, nighttime restlessness significantly improved.

Conclusion: Augmentation of RLS is rarely seen in pediatrics. This case emphasizes the importance of multidisciplinary management of patients on dopaminergic medication with RLS. Given limited agents are available to treat pediatric movement disorders, this specific population may benefit from non-standard interventions such as more frequent and strategically timed dosing. When possible, sleep providers should consider other agents with less risk of augmentation, such as alpha-2-delta ligands. Finally, this case emphasizes the clinical impact of iron supplementation given significant improvements in symptoms after optimizing ferritin storage.

Support (if any):